Bureau (No 4) Department.

FILES SERIES.

S.C., No. 168-68A

Dated 22 March

[Register Abstract.]

Iron smelting in the Salem Dk.

Directing the publication of the Bds' Proc. submitting to Govt. views on the subject of the cost of Charcoal for —— and on the annual supply of Charcoal available

Jcw 3 2c 4/98 to 425
2.8.98

Revenue (1898) Department.

CURRENT No. 1005

From The Board of Revenue Land Rev.

Order No. 556

Dated 1st December 1897

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SUBJECT.

Subj to Govt Bd's views on the subject of the cost of charcoal for iron smelting in the Salem dist & on the annual supply of charcoal available.

REVENUE DEPARTMENT.

1897.

Board of Revenue

(Land Revenue),

MADRAS.

Printed January th, 1898.

Proceedings, Forest No. 556, 18th December 1897.

DECEMBER.

Submitting to Government Board's views on the subject of the cost of charcoal for iron-smelting in the Salem district and on the annual supply of charcoal available.

PROCEEDINGS OF THE BOARD OF REVENUE
(LAND REVENUE).

READ—the following letter from F. P. POPERT, Esq., Conservator of Forests, Central Circle, to the Secretary to the Commissioners of Land Revenue, dated Camp Mount Stuart, 21st November 1897, No. 987 :—

[*Reference.*—Board's Resolution, paragraphs 4 (2) and 7 of No. 361, dated 23rd September 1896].

I have the honour to forward, in original, reports by the District Forest-officer, North Coimbatore, and Mr. Alwar Chetty, Extra Assistant Conservator of Forests, with office-note by Mr. Brasier and letter from the Collector, Salem.

2. Since the commencement of the correspondence upon this subject, conditions have very materially changed, and the provision of a constant supply of charcoal to work the Kanjamalai iron beds is, I consider, for the present at all events, and for several years probably will be impracticable.

3. The circumstances which have led to this change are briefly :—

(*a*) The continued and increasing demand for fuel at Salem by the Madras Railway.

(*b*) The abandonment of proposed reserves to provide a liberal margin of unreserved lands for communal purposes.

(*c*) The grazing requirements of the ryots. This matter was not sufficiently considered. Systematic and intensive working of the forests would necessitate the closure for several years or a large portion and in large blocks of the forests.

4. Under the above-mentioned circumstances, it is needless to consider further the supply of charcoal from the Cauvery forests.

5. The industry, if it is to be developed, I mean if the manufacture of iron is to be conducted locally, will have to be confined to the Tirtamalai beds. From the statement appended to Mr. Brasier's office-note, No. 2445, dated 23rd October 1897, he now estimates that within a radius of 16 and 25 miles respectively, there will be 224,250 and 288,642 acres of reserved and proposed reserved forests available for the manufacture of charcoal.

6. These forests have been less indented upon; the growth is, for the most part, denser than in the forests near the Kanjamalai beds, and there is little doubt the average annual increment is greater. Mr. Brasier estimates the latter at three-fourths of a ton per acre per annum. This estimate will probably be realized, but in the commencement it will be safer to assume half a ton per acre per annum as the average annual increment.

7. The area mentioned in paragraph 5 will have to be reduced to exclude rocky, bare and unworkable parts, and 25 per cent. may be accepted as a fair margin. This reduces the workable area to about 168,000 and 216,400 acres respectively. Further deductions are necessary. Parts of these forests contain valuable wood which would not be felled for charcoal. In addition in places provision may have to be made for local requirements. It has also to be borne in mind that fuel as well as charcoal will be required. I consider it will not be safe to accept more than 120,000 and 160,000 acres (according to the adoption of the 16 or 25 mile area) as available for charcoal manufacture.

8. The average annual yield would therefore be 60,000 and 80,000 tons of wood or 12,000 and 16,000 tons of charcoal (allowing 5 tons of wood to yield 1 ton of charcoal).

9. The system generally of working these forests would be coppice with retention of a percentage of the more valuable trees as standards, and it would not be advisable, until further experience has been gained, to adopt a shorter rotation than thirty years.

10. Mr. Brasier estimates the cost of the charcoal at Rs. 12-12-0 for the 16-mile areas :—

	RS.	A.	P.
Cost of billetting, &c., 5 tons of wood at Rs. 1-8-0	7	8	0
Piling wood in kilns and general supervision	0	8	0
(I see no reason to question these. Mr. Brasier has had great experience and is well acquainted with the local rates).			
Interest on outlay for rough cart-tracks	1	0	0
(Assuming that the outturn is only 10,000 tons annually, this would allow Rs. 10,000 for roads).			
Carriage of 1 ton an average distance of 8 miles, Rs. 1-12-0.	2	4	0
(This is a doubtful factor and depends upon the position of the furnaces. I would increase Mr. Brasier's rate by As. 8 to allow for increased distances).			
Seigniorage	2	8	0
(Mr. Brasier's estimate is, I consider, too low. Annas 8 per ton of wood or Rs. 2-8-0 per ton of charcoal is not a high seigniorage).			
Sundries (loading and unloading charcoal)	0	8	0
Cost of general supervision	0	8	0
Total cost per ton of charcoal ...	14	12	0

11. One point to be noticed is the transfer of the work to the Tirtamalai beds entails carriage to the railway some 14 miles.

12. A tracing showing approximately the position of the forests is appended.

ENCLOSURE.

Office-note from C. E. BRASIER, Esq., District Forest-officer, Salem, to the Conservator of Forests, Central Circle (through the Collector of Salem), dated 23rd October 1897, No. 2445-For.

* * * * *

As regards paragraph 20 of the report, the Extra Assistant Conservator, I see, is of opinion that the insufficient supply of carts would be an obstacle in the way; but I would point out that probably a company working on a large scale would find that it would be advantageous to them to maintain a portion of the transport machinery, viz., carts and bulls, themselves and so be partially independent of local supply, or at least they might make advances to ryots for carts and bulls on condition that their carts and the ryots' labour would be available for hire when required, the advances being recovered from the hire of carts gradually. This is the method adopted by many private contractors in order to cart fuel to the railway.

* * * * *

In these circumstances, therefore, it is necessary to more closely examine the existing conditions which would be favourable to working one of the other iron beds of the district; and after perusing the mass of correspondence which has appeared on the iron question since I left the district on furlough, I observe that the advantages of having the fuel supply and ore supply as near one another as possible seem to outweigh all others; and further I observe that Mr. Head considers it would be a disadvantage to cart the ore to the fuel as I proposed in my first report on this subject. Bearing these two axioms in mind, it will be necessary to reconsider the site I selected at Hanumathirtam as the most convenient for working the Tirtamalai ore, as well as the advantages which, under the conditions now brought to light, the working of Tirtamalai ore offers in comparison with the other iron beds of the district. These advantages are as follows :—

1*st.*—The area of forests within a 16 miles radius of the Tirtamalai beds is as great if not greater than adjoining any other iron bed of the district.

2*nd.*—These forests, speaking generally, have been less drawn on by the local demands than any other forests of the district, and therefore should yield a larger outturn per acre at the commencement of felling.

3*rd.*—A greater average annual increment can be expected from most of the forests near Tirtamalai than any other forests of the district, because they include the moist Kottapatti valley and some Javadi hill forests, to which Dr. Brandis specially referred in paragraphs 497 and 498 of his suggestions as forests capable of yielding an average annual increment of two tons per acre per annum.

4*th*.—The forests could be more easily worked in the Kottapatti valley than the other forests as a good District Board road and a fairly good cart-track exists up the centre of this valley, on both sides of which the forests might be easily and cheaply worked for charcoal.

5*th*.—A certain area of the forests of the South Arcot district could be utilized also for the supply of charcoal, if the furnace was situated at Tirtamalai.

6*th*.—Government could afford to charge a less seigniorage for charcoal from these forests than from any other of the district, say, Rs. 1-8-0 per ton which, I think, by reason of the small demand now made on these forests, would be fair.

The disadvantages which these forests would offer in comparison with others are :—

1*st*.—Their feverish situation. This, however, I do not believe to be such as to prevent the establishment of works more especially if a fairly large area of forest around the proposed site was first cleared and burnt and then kept clear and good deep wells sunk in order to obtain a pure supply of drinking water.

2*nd*.—The somewhat scanty labour supply in comparison with other localities in the district. But the labour is not so scanty as to prevent the establishment of works.

3*rd*.—The site is not situated near the railway, but would be at a distance of about 14 miles from it. If the Singarapet, Samalpatti and Trinamalai branch line was constructed, this distance would be reduced to eight miles, and it might then be possible to utilize Bengal coke in conjunction with wood. The coke might be landed at Cuddalore and railed to Singarapet and thence trammed to the works. It is evident, however, that the cost of carriage would in this case be considerable.

It now remains to consider the area of forests within a 16 and 25 miles radius of the works at Tirtamalai. I take a 25 miles advisedly, as it appears to me from a perusal of the papers now available that charcoal would bear the carriage for this distance. These forests and their areas are as follows :—

FORESTS within 16 and 25 miles of Tirtamalai.

Smelting centre.	Forests within 16 miles.			Forests within 25 miles.		
	Serial No.	Name.	Acre.	Serial No.	Name.	Acre.
Thirthamalai Centre.	1	Vellakal	863	1 to 36	As per forest within 16 miles	224,250
	2	Pudur Punguni	1,120	37	Nochikuttai	8,885
	3	Sundamalli	560	38	Kauramalai extension	2,768
	4	Govindapuram	2,304	39	Mukkunur A and B	2,060
	5	Singarapet	2,637	40	Mambakkam	10,816
	6	Eavampady	3,888	41	Thumbal	3,670
	7	Puvampatti	5,286	42	Thumbal extension	1,800
	8	Puvampatti extension	1,544	43	Mattikottai	3,682
	9	Alambadi	512	44	Kudimaduvu	4,424
	10	Tirtamalai	16,294	45	Pungamaduvu	2,408
	11	Veppampatti	10,680	46	Pilappadi	5,441
	12	Kottapatti	11,561	47	Narthenchedu extension	973
	13	Chittingi	3,342	48	Bouthikal	294
	14	Chitteri	3,459	49	Bothakadu	2,822
	15	Chitteri extension	5,971	50	Kuttar	5,389
	16	Annapalayam	10,578	51	Kuttar extension	1,472
	17	Kalnad	5,793	52	Narthenchedu	2,598
	18	Thombakal	9,608	53	Vellampatti proposed	4,890
	19	Pallippatti	11,192		Total	288,642
	20	Thombakal extension	5,563			
	21	Harur	1,679			
	22	Singarapet extension	5,939			
	23	Inner Javadis	32,090			
	24	Obbmayakampatti	1,660			
	25	Morapur	5,982			
	26	Ponnagarapatti	3,769			
	27	Vattampatti	1,563			
	28	Poyyapatti	3,256			
	29	Onnakarai	3,065			
	30	Karangal	5,919			
	31	Kauramalai	8,512			
	32	Kallavi	4,160			
	33	Kottapatti extension proposed	14,816			
	34	Veppampatti do. do.	4,602			
	35	Chittingi do. do.	3,069			
	36	Nochikuttai do. do.	5,924			
		Total	224,250			

The above statement does not include any recently abandoned reserves.

Now as regards the average annual increment to be applied to these forests, I consider that this might amount to anything from half a ton to one and a half tons more especially considering the area includes a large area of bamboo forests and the forests of the moist Kottapatti valley. But as it is always advisable to underestimate rather than over-estimate in a matter of this sort, I think an annual yield of three-fourths of a ton per acre may be assumed for the whole area; this would mean an annual yield of 25,228 and 29,472 tons of charcoal, respectively, according as the 16 miles radius or 25 miles radius was adopted. This is after making a deduction of 25 per cent. for rocky and unworkable and poorly stacked portions.

As regards the cost of the supply of 1 ton of charcoal, I would estimate them as follows :—

	RS.	A.	P.
Cost of billeiting and felling, &c., 5 tons of wood at Rs. 1-8-0 per ton	7	8	0
General supervision of burning, &c.	0	8	0
Interest on outlay for rough cart-tracks	1	0	0
Carriage of 1 ton over average distance of 8 miles	1	12	0
Seigniorage	1	8	0
Sundries (loading and unloading)	0	8	0
Total	12	12	0

For the 25 miles limit, an extra Re. 1 should be added to the above cost of charcoal per ton.

RESOLUTION—Forest No. 556, dated 18th December 1897.

In paragraph 4 (2) of Board's Proceedings, No. 361, dated 23rd September 1896, recorded with Government Order, Mis. No. 4864, dated 30th November 1896, the Board called on the Conservator of Forests, Central Circle, to submit a revised estimate of the cost of supplying charcoal for iron-smelting at Kanjamalai in the Salem district and the annual supply available.

2. Since these proceedings were issued, Major Mahon has remarked in papers recorded with Government Order, No. 24, dated 19th January 1897, that it is futile to expect an iron industry, in the proper acceptation of the term, to grow from any scheme for using charcoal fuel alone. This is true no doubt, and the Board has strongly advocated the propriety of carrying on the experiments with coal and iron ore recommended by Major Mahon, but there seems no reason why the possibility of the manufacture by charcoal fuel on a limited scale should not also be investigated and placed on record.

• Page 2, paragraph 2.

3. From Mr. Popert's letter and the other papers recorded above, it will be seen that so long as the Madras Railway burns wood fuel, the idea of manufacturing iron with charcoal at Kanjamalai must be abandoned, as no iron industry could afford to pay for fuel prices now paid by the Madras Railway. Consideration must therefore be to the fuel resources available in the neighbourhood of Tirtamalai, where enormous beds of rich iron ore are also to be found (*vide* page 10 (5) of Handbook No. 8, Iron—Imperial Institute Series). The portions of the papers forwarded by the Conservator which relate to the Kanjamalai forests alone have been omitted from the printed record.

4. From Mr. Popert's letter it will be seen that, after making large deductions from the District Forest-officer's estimate of the amount of wood available and adding to his estimate of cost wherever any room for doubt exists, he is satisfied that an annual supply of 12,000 tons of charcoal could be brought to the Tirtamalai beds from forests within a radius of 16 miles at a cost of Rs. 14-12-0 per ton. For every ton of charcoal, however, about 15 cwt. of firewood is also necessary, so the available yield of the forests may be taken at 10,000 tons of firewood to be used as fuel and 50,000 tons to be made into 10,000 tons of charcoal, the amount required for an annual outturn of 10,000 tons of pig iron.

5. The cost price of charcoal pig iron put f.o.b. at Madras was estimated by Mr. Jeremiah Head as follows *:—

		Rs.	A.	P.
1.	Iron ore 1 ton 17 cwt. at Rs. 3	5	8	10
2.	Charcoal 1 ton at Rs. 24	24	0	0
3.	Limestone 5 cwt. at Rs. 3	0	12	0
4.	Firewood 15 cwt. at Rs. 4	3	0	0
5.	Stores and renewals	3	0	0
6.	Wages and salaries	17	0	0
7.	Delivery to Madras 200 miles at 6 pies per ton per mile	6	4	0
8.	Agent at port	1	4	0
9.	Putting f.o.b. at port	1	4	0
10.	Establishment charges	4	0	0
	Total	66	0	10

* Page 17 of Board's Proceedings, No. 361, dated 23rd September 1896.

6. These figures have already been criticised by the Board, but they will be dealt with again as the Board has since had the advantage of reading Major Mahon's remarks printed in Board's Proceedings, No. 24, dated 19th January 1897.

Item No. 1—*Iron Ore.*—Mr. Head has taken the price at Beypore, which includes carriage by boat. It may, however, be accepted as Major Mahon points out that Mr. Head's estimate for collecting and picking is very low.

Item No. 2—*Charcoal.*—For the reasons given above, the charges on account of this item may be reduced to Rs. 14-12-0, including supervision and a seigniorage of Rs. 2-8-0 to Government being at the rate of As. 8 per ton of wood used.

Items Nos. 3, 4 *and* 5 may be accepted.

Item No. 6—*Wages and Salaries.*—In paragraph 4 of its Proceedings, No. 361, dated 23rd September 1896, the Board pointed out the impossibility of accepting anything approaching the estimate made by Mr. Head for wages and salaries. Major Mahon † would reduce it to Rs. 2-6-5 for works carried on on a very large scale, and points out that the cost of wages was estimated for the Barrakur steel works project at Rs. 3-8-0 to Rs. 2-12-0 per ton including officials. The supervision charges would probably be high in works on the comparatively small scale under consideration, but twice the amount estimated for Barrakur or Rs. 7 would probably be ample.

† Page 3 of Board's Proceedings, No. 24, dated 19th January 1897.

Item No. 7—*Rail to Madras.*—Mr. Head takes the rate of carriage to Madras at 6 pies per ton, but in his letter recorded in Board's Proceedings, No. 1275, dated 5th April 1897, the Agent of the Madras Railway has reported that pig iron in 12-ton wagon loads can be carried at 3 pies per ton per mile. The charge for this item must therefore be reduced to Rs. 3-2-0.

Item No 8.—Major Mahon points out that the item "Agent at port" is unnecessary and should be included in establishment.

Item No. 9.—This may be accepted.

Item No. 10.—*Establishment.*—The Board has already remarked that the cost of office establishment in Madras or London should be much less than Rs. 4 per ton, which would be Rs. 40,000 or Rs. 3,333-5-4 per mensem in the case of works with an annual outturn of 10,000 tons. Rs. 2 would no doubt be ample for items 8 and 10 together.

7. If the works were situated at Thirthamalai instead of at Kanjamalai, a further sum of Rs. 1-12-0 per ton would have to be added for the carriage of pig iron 14 miles to the railway station.

8. The Board's estimate of the cost price of charcoal pig iron put f.o.b. at Madras would thus be —

		Rs.	A.	P.
	Iron ore—P-1	5	8	10
	Charcoal	14	12	0
	Limestone	0	12	0
	Firewood	3	0	0
	Stores and renewals	3	0	0
	Wages and salaries	7	0	0
	Carriage to railway station	1	12	0
	Rail to Madras	3	2	0
	Putting f.o.b. at Madras	1	4	0
	Establishment	2	0	0
	Total	42	2	10

9. As the law at present stands, the rate of exchange is not likely ever materially to exceed 1*s* 4*d.* per rupee, so the Board's estimate of putting a ton of charcoal pig iron f.o.b. at Madras may be taken at £2-16-6, and adding to this 15 shillings per ton for freight it would be possible to deliver it in London at £3-11-6, while the value per ton of Swedish pig iron delivered at a British port is stated by Mr. Head to vary from £4-1-0 to £5-0-9. It would also compete on favourable terms with Hematite pig imported into India, the average cost at Madras being * £3-3-6.

* Page 17 of Board's Proceedings, No. 361, dated 23rd September 1896.

(True Copy and Extract.)

Secretary.

To the Secretary to Government, Revenue Department, with tracing.

Exd. A. Rungasawmy Aiyangar.

No. and date of the receipt for the payment of money by the Scholar (To be filled up by Cashier) (5)	Latest date by which the copies will be ready as intimated to the schclar. (6)	Date of actual delivery. (7)	Acknowledgement of the Scholar or his authorised agent. (8)

ereen received. The ore has been despatches. Both the coal also but we have received no advice.

Another point was also raised by the Board viz the possibility of manufacturing iron here by charcoal at Salem. Both Mr Head & Major Mahon were of opinion that this could not be done on any large scale. The Board has (please see enclosure) collected information & data which seems to establish that 10000 tons of pig iron could be turned out annually at a rate R à h 42-2-10 £ s d + 2-16-6 per ton which would compare favorably with the Hematite pig rate at which Swedish iron is imported into £ s d England Madras viz 3-3-6. adding 15 shillings the estimated freight portion

to England, the price of the Indian ore, when would be £ s d 3-11-6 per ton as against £ s d 4-1-0 to 5-0-9 the rate paid for Swedish ore per ton delivered at a British port.

The draft order proposes to publish this information & the draft letter communicate, to the Secretary of State together with a similar precis of what has been done here in the despatch of Jan 26.

WMc 12/8/98

Secy

The Gundoh coal has since been shipped please see alteration necessitated recent inserting on page 7 of the letter.

Efforts will be made to get it ready signed & despatched by Friday's mail WMc 17/2/98 Dde 5/4

D/S 29/3/98

C.1791. 4.4.98. 2.16.34.

Read again G/O. 666/24.11.96 (abs)
221/30.3.97 (abs)
1007/3.12.97 (abs)
C No 1008 of 1898
B.P. (Ex.C.) No 5567 dt 11.12.97

Order No. 1680/ 22nd Mar: 1898.

The Proceedings of the Board of Revenue read above will be placed at the disposal of the press and also be published in the Fort St George Gazette.

2. The following despatch will be forwarded to the Right Honourable the Secretary of State for India in reply to his Lordship's despatch No 10 dated the 2nd July 1896.

Endt No 168A.

Copy to the Govt of India Dept of Revd

To the Board (Ex.C.) with drawing
To the Editors' table
To the Supdt Govt Press

C. 1/3/98
4.4.97 to 2.16.398.

Original Despatched 24.3.98.

A
in G.O.no 3506
1.9.96

A&C 24.3.98

D
in G.O.no 3506
1.9.96

A

Despatch 1

To

the Right Honourable the
Secretary of State
for India.

My Lord,

We have the honour to reply to your Lordship's despatch No 10 dated the 2nd July 1896 in which your Lordship desires to be informed whether we concur in the Conclusions arrived at by Mr Jeremiah Head in his Report on the practicability of working the Iron ores of the Salem Dis. both in this Presidency.

2. As observed by your Lordship in para 2 of the despatch under reply, Mr Head had no doubt thoroughly gone into the question referred to him for opinion and arrived at the conclusion that it would not be commercially profitable to export the Salem iron ore

ore in bulk to England or to manufacture iron and steel on the spot or in Madras, with charcoal from the neighbouring forests or with Coke from the Singareni or Barra-Kur Coal fields.

3. Before however, expressing our opinion as to the soundness of the above Conclusions, we deemed it desirable to consult the Board of Revenue and to cause the papers & premises and arguments ^ the carefully scrutinized. [illegible] to Proceedings dated the 23rd Sep. Letter 1896, No 361, the Board of Revenue observed that it was necessary to invite further discussion and to call for further information before some of Mr. Head's important Conclusions could be accepted as satisfactorily established. Taking the fourth Conclusion in the Summary at the end of Mr. Head's report, namely that it would be impossible to manufacture

C in G.O. No 3506 dt 1.9.96.

D in G.O No 666 dt 25.11.96

E in page 24 of report in G.O. No 3506 dt 1.9.96.

D. in pages 25-26 of Go. 666 24.11.96

para 4(2), (7) in above B.P.

Go. 666 dt 24.11.96 R.

letter in page 2 of Go. 221 30.3.97. F.

manufacture charcoal per iron in the Salem District under Rs 66-0-10 per ton, the Board of Revenue pointed out that some of the items of charges which Mr. Head had included in the estimate [illegible] might possibly be cut down, and that charcoal iron might be produced in Salem at a figure much below Mr. Head's estimate. We therefore awaited the further information on the point which the Board had called for ascertainment, and in the meantime ordered the correspondence on the subject to be placed at the disposal of the Press and also to be published in the Fort St George Gazette, in order to afford an opportunity to those who might be interested in, or have special knowledge of, the matter, to freely discuss the questions involved arising.

4. In December 1896, we received from the Gov-

Govt of India: Copies of a report by Major Mahon R.A. Superintendent, Foundry and Shell Factory at Cossipur on the manufacture of iron and steel in India, and also of a letter from the same officer in which he traversed Mr. Heaviside Head's conclusions on the question of working the Salem iron ores. Major Mahon admitted that Mr Head was in consulting proposed to export the Salem ore to England was out of the question, and observed that the States that 'it was equally futile to expect an iron industry in the proper acceptation of the term, to grow from any scheme for using charcoal fuel only, that in no country and under no conceivable circumstances could charcoal fuel form anything but a small adjunct to that required for iron industry proper.'

Taking however the question of

× G. in pages 5–17 of Go. 221 of 30.3.97.

& printed as enclosure No 3 in pages 2–4 of Go. 221 30.3.97

F

E page 24 of report in Go. 3506 1.9.96.

of the manufacture of pig iron with Indian coke, which was disposed of by Mr Head in the closing paragraph of his report, as not likely to improve the chances of success, Major Mahon pointed out that some of the figures adopted by Mr Head were erroneous and that pig iron could possibly be manufactured at Calcutta, out of the Salem ores, with coke from Bengal Coal at a cost of Rs 45-15-1 per ton as against Mr Heads estimate of Rs 66-0-1 per ton of charcoal pig; and accordingly, while strongly supporting the proposal referred to in para 3 of Your Lordship's despatch, namely, to send 300 tons of Salem ore to England to Messrs Bolchow Vaughan and Co of Middlesborough on Tees for experimental purposes, he recommended that 600 tons of Bengal Coal of a quality equal

to the Sauctoria Coal Mauld
also be despatched to the
above firm, to be Coked
by them and used in the
reduction of the Salem ore,
so that a trustworthy forecast
may be made of the quantity
of fuel and flux and
further information of
value obtained as to the
best mixes and size of the blast
furnace charge with suitable.

5. On perusing Major
Mahon's communications and
after consulting the Board
of Revenue, we considered that reasonable
grounds existed for subscribing
to the request of Mr Heath's
memorial regarding the manufacture
of pig iron with Indian coke,
and that it could not be
accepted without a practical
experiment on a large
scale, as suggested by
Major Mahon. We therefore,
in March 1897, solicited
the Sanction of the Govt
of India to the despatch

H para 6 of B.P. No 246 dy 19.1.97
which was tacitly accepted
in Go No 221 / 30.3.97

Letter No 222 dy 30.3.97

J

of 300 tons of Salem ore
and 600 tons of Bengal coal
to Messrs Bolchow Vaughan
and Co. for the purpose
of determining by experi-
mental manufacture, the
value and cost of produc-
tion of pig iron made from this
ore with Indian coke.

6. The Govt of India
after some correspondence
with Your Lordship, have decided
in November last that two
hundred tons of Salem ore and
five tons of Sauctoria coal
should be sent to England for a
preliminary experiment.
In January last
subsequently they ob-
served that the Consignment
of coal should be raised to
one hundred tons. The
two tons of iron ore were shipped
from Madras
per S.S. Rewa on the 9th ultimo
to be forwarded to regarda the coal,
which the Bengal Coal
Company have undertaken to
deliver from Calcutta
have not yet been
received.

Letter dy 5.11.97 No 52 Comm.
in page 3 of Go No. 1007 / 3.12.97 K

Letter No 4 C 19 / 20.1.98 M
Go No 427 / 27.1.98

para 3 of Go No. 1014 / 28.2.98 L

and the 105 tons of coal
were shipped from Calcutta
per S.S. Golconda on the
3rd instant.

the results of the proposed experiment.
at Mannapracture from Salem Ore
Conducted in England
7. The further information which was called for by the Board of Revenue in order to enable them to examine Mr Head's estimate of the Cost of Manufacturing Charcoal pig iron in ... having been since received and reviewed by the Board of Revenue in its Proceedings dated the 18th December 1897 No 556 F. of which a copy is herewith enclosed, we are now in a position to deal satisfactorily with all the eight Conclusions recorded except the seventh, in the summary at the end of Mr Head's report.

8. The first and second Conclusions are merely statements of facts and call for no remarks.

9. The third Conclusion. We are now led to

C No 1008/98.

E page 24 of Mr Head's report in Go No 3506/1.9.96 E

page 10 of his report in G.o. No 3506/1.9.96 S

report in Go 123/1.3.98 P

established. Experience
Assuming that the Salem
ore contained about 63
per cent as the average, and taking the
rate of exchange at Rs
16-7-0 per sovereign,
as Mr Head will be
seen, arrived at the result
that the proposal to export
the ore to England involved
a loss of Rs 3-11-0 per ton.
The Board's assumption
however, regarding the
richness of the Salem ore
and the rate of exchange would
seem to require correction
now. Mr Middlemiss
of the Geological Survey
recently inspected the
iron ore beds of the Kanjamalai
Hills in Salem and examined
several specimens of ore
found at different spots
and reports that the average
yield of iron from the
ore now is not likely
to exceed 40 per cent

that the richness of the ore had [illegible] been over estimated. The exchange value of the Rupee has also risen since the date of Mr Head's report, the current rate of exchange being fifteen Rupees annas for per Sovereign as against Rs 16-7 adopted by Mr Head & the prospects of exporting the ore in bulk to England with Commercial success, has [illegible] become decidedly unfavourable, [illegible] that it was thought at the time of Mr Head's [illegible].

16. The fourth, fifth, sixth and eighth Conclusions. With regard to these, it is have already stated that the attempt to develop an iron industry in Salem with the aid of charcoal fuel alone, having been Condemned by Major Mahon, steps have been taken to investigate [illegible] feasibility of working the ore with Indian coke. At the same time, however, as observed by the Board of Revenue in para 2 of its Proceedings No 556 dated the 18th December 1896, the results of the enquiry into the possibility of working the ore with charcoal on a limited scale may as well be placed on record. Your Lordship will observe from the Board's Proceedings above quoted that the provision of a constant supply of charcoal to work the Kanjamalai ores at the Kadiampatti centre which was contemplated in Mr. Stokes's memorandum printed in pages 13–18 of G.O. No 420 dt 4.7.95, has since become impracticable on account of the Continued and increasing demand for wood fuel at Salem by the Madras Railway & that there is a fair prospect of

C No 1008/98.

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wor.

working the Trilamalai beds with charcoal from the forests, within a radius of 16 miles, and that there is fuel available for an annual outturn of 10,000 tons of pig iron. Mr Head's estimate of the cost of manufacture of charcoal pig iron at Salem has also been revised by the Board of Revenue in the light of the more recent information ~~... further~~ received, and it will be seen that the cost which was originally estimated by Mr Head at Rs 66-0-0 per ton has been reduced by the Board of Revenue, to Rs 1,2. 2.10. Your Lordship will thus see that Mr Head's fourth, fifth, sixth & eighth conclusions could not be accepted as established, but that on the other hand, there seems no reasonable grounds for estimating that the charcoal pig iron manufactured at Salem could be put on the English market at 3£ 11s 6d per ton, taking the rate of exchange as not exceeding 1/4d per Rupee, and that it has therefore very fair chance of competing on favourable terms with according to Mr Head the Swedish pig iron imported into England at rates varying from £4-1-0 to £5-0-9, and with hæmatite pig iron imported into Madras at the average rate of 3£ 3s 6d per

12/3/98

2 passing in No 3506 1-5-96 M.

× Taken from info 18 of Mr Head's report in No 3506 1-5-96 N:

clk 11/3/98

Note:- Two printed Copies of the Despatches have been Sent to the Rt. Hon. the Secy. of State for India on 31.3.98. one with Enclosures & the other without Enclosures. Also One Copy to Madras Govt. & India sent on 1-4-98.

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A.B.D 1.4.98

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Government {1898} of Madras.

REVENUE.

Recd. } 1898. *Enclosures*

Regd. } *Spare copies*

G.O., Nos. 168, 168A, 22nd March 1898.

MARCH.

Iron smelting in the Salem district.

Directing the publication of the Board's Proceedings submitting to Government its views on the subject of the cost of charcoal for — and on the annual supply of charcoal available.

GOVERNMENT OF MADRAS.

REVENUE DEPARTMENT.

Read—again G.O., No. 666, Revenue, dated 24th November 1896.

Abstract.—Ordering that the papers regarding the iron ores of the Salem district be placed at the disposal of the press as recommended by the Board of Revenue.

Read—again G.O., No. 221, Revenue, dated 30th March 1897.

Abstract.—Agreeing with the Board of Revenue in considering that it is desirable to despatch to Messrs. Bolchow, Vaughan and Co. of Middlesborough-on-Tees, a consignment of Salem ore and Bengal coal for the purpose of determining, by actual experiment, the value and cost of production of pig-iron made from Indian ore with Indian coke.

Read—again G.O., No. 1007, Revenue, dated 3rd December 1897.

Abstract.—Passing orders on the subject of the despatch to Messrs. Bolchow, Vaughan & Co. of a sample of Salem iron ore and Indian coal for the purpose of determining by experimental manufacture the value and cost of production of pig-iron made from Indian ore with Indian coke.

Read—also the following Proceedings of the Board of Revenue (Land Revenue), Forest No. 556, dated 18th December 1897:—

Read—the following letter from E. P. POPERT, Esq., Conservator of Forests, Central Circle, to the Secretary to the Commissioners of Land Revenue, dated Camp Mount Stuart, 21st November 1897, No. 987:—

[*Reference.*—Board's Resolution, paragraphs 4 (2) and 7 of No. 361, dated 23rd September 1896].

I have the honour to forward, in original, reports by the District Forest-officer, North Coimbatore, and Mr. Alwar Chetty, Extra Assistant Conservator of Forests, with office-note by Mr. Brasier and letter from the Collector, Salem.

2. Since the commencement of the correspondence upon this subject, conditions have very materially changed, and the provision of a constant supply of charcoal to work the Kanjamalai iron beds is, I consider, for the present at all events, and for several years probably will be impracticable.

3. The circumstances which have led to this change are briefly:—

(*a*) The continued and increasing demand for fuel at Salem by the Madras Railway.

(*b*) The abandonment of proposed reserves to provide a liberal margin of unreserved lands for communal purposes.

(*c*) The grazing requirements of the ryots. This matter was not sufficiently considered. Systematic and intensive working of the forests would necessitate the closure for several years or a large portion and in large blocks of the forests.

4. Under the above-mentioned circumstances, it is needless to consider further the supply of charcoal from the Cauvery forests.

5. The industry, if it is to be developed, I mean if the manufacture of iron is to be conducted locally, will have to be confined to the Tirtamalai beds. From the statement appended to Mr. Brasier's office-note, No. 2445, dated 23rd October 1897, he now estimates that within a radius of 16 and 25 miles respectively, there will be 224,250 and 288,642 acres of reserved and proposed reserved forests available for the manufacture of charcoal.

6. These forests have been less indented upon; the growth is, for the most part, denser than in the forests near the Kanjamalai beds, and there is little doubt the average annual increment is greater. Mr. Brasier estimates the latter at three-fourths of a ton per acre per annum. This estimate will probably be realized, but in the commencement it will be safer to assume half a ton per acre per annum as the average annual increment.

7. The area mentioned in paragraph 5 will have to be reduced to exclude rocky, bare and unworkable parts, and 25 per cent. may be accepted as a fair margin. This reduces the workable area to about 168,000 and 216,400 acres respectively. Further deductions are necessary. Parts of these forests contain valuable woods which would not be felled for charcoal. In addition in pla[illegible]vision may have to be made for local requirements. It has also to be borne in mi[illegible] fuel as well as charcoal will be required. I consider it will not be safe to accept more than 120,000 and 160,000 acres (according to the adoption of the 16 or 25 mile area) as available for charcoal manufacture.

8. The average annual yield would therefore be 60,000 and 80,000 tons of wood or 12,000 and 16,000 tons of charcoal (allowing 5 tons of wood to yield 1 ton of charcoal).

9. The system generally of working these forests would be coppice with retention of a percentage of the more valuable trees as standards, and it would not be advisable, until further experience has been gained, to adopt a shorter rotation than thirty years.

10. Mr. Brasier estimates the cost of the charcoal at Rs. 12–12–0 for the 16-mile areas:—

	Rs.	A.	P.
Cost of billetting, &c., 5 tons of wood at Rs. 1–8–0	7	8	0
Piling wood in kilns and general supervision	0	8	0
(I see no reason to question these. Mr. Brasier has had great experience and is well acquainted with the local rates).			
Interest on outlay for rough cart-tracks	1	0	0
(Assuming that the outturn is only 10,000 tons annually, this would allow Rs. 10,000 for roads).			
Carriage of 1 ton an average distance of 8 miles, Rs. 1-12-0.	2	4	0
(This is a doubtful factor and depends upon the position of the furnaces. I would increase Mr. Brasier's rate by As. 8 to allow for increased distances).			
Seigniorage	2	8	0
(Mr. Brasier's estimate is, I consider, too low. Annas 8 per ton of wood or Rs. 2–8–0 per ton of charcoal is not a high seigniorage).			
Sundries (loading and unloading charcoal)	0	8	0
Cost of general supervision	0	8	0
Total cost per ton of charcoal ...	14	12	0

11. One point to be noticed is the transfer of the work to the Tirtamalai beds entails carriage to the railway some 14 miles.

12. A tracing showing approximately the position of the forests is appended.

Enclosure.

Office-note from C. E. BRASIER, Esq., District Forest-officer, Salem, to the Conservator of Forests, Central Circle (through the Collector of Salem), dated 23rd October 1897, No. 2445-For.

* * * * *

As regards paragraph 20 of the report, the Extra Assistant Conservator, I see, is of opinion that the insufficient supply of carts would be an obstacle in the way; but I would point out that probably a company working on a large scale would find that it would be advantageous to them to maintain a portion of the transport machinery, viz., carts and bulls, themselves and so be partially independent of local supply, or at least they might make advances to ryots for carts and bulls on condition that their carts and the ryots' labour would be available for hire when required, the advances being recovered from the hire of carts gradually. This is the method adopted by many private contractors in order to cart fuel to the railway.

* * * * *

In these circumstances, therefore, it is necessary to more closely examine the existing conditions which would be favourable to working one of the other iron beds of the district; and after perusing the mass of correspondence which has appeared on the iron question since I left the district on furlough, I observe that the advantages of having the fuel supply and ore supply as near one another as possible seem to outweigh all others; and further I observe that Mr. Head considers it would be a disadvantage to cart the ore to the fuel as I proposed in my first report on this subject. Bearing these two axioms in mind, it will be necessary to reconsider the site I selected at Hanumathirtam as the most convenient for working the Tirtamalai ore, as well as the advantages which, under the conditions now brought to light, the working of Tirtamalai ore offers in comparison with the other iron beds of the district. These advantages are as follows:—

1st.—The area of forests within a 16 miles radius of the Tirtamalai beds is as great if not greater than adjoining any other iron bed of the district.

2nd.—These forests, speaking generally, have been less drawn on by the local demands than any other forests of the district, and therefore should yield a larger outturn per acre at the commencement of felling.

3rd.—A greater average annual increment can be expected from most of the forests near Tirtamalai than any other forests of the district, because they include the moist Kottapatti valley and some Javadi hill forests, to which Dr. Brandis specially referred in paragraphs 497 and 498 of his suggestions as forests capable of yielding an average annual increment of two tons per acre per annum.

4th.—The forests could be more easily worked in the Kottapatti valley than the other forests as a good District Board road and a fairly good cart-track exists up the centre of this valley, on both sides of which the forests might be easily and cheaply worked for charcoal.

5th.—A certain area of the forests of the South Arcot district could be utilized also for the supply of charcoal, if the furnace was situated at Tirtamalai.

6th.—Government could afford to charge a less seigniorage for charcoal from these forests than from any other of the district, say, Rs. 1-8-0 per ton which, I think, by reason of the small demand now made on these forests, would be fair.

The disadvantages which these forests would offer in comparison with others are:—

1st.—Their feverish situation. This, however, I do not believe to be such as to prevent the establishment of works more especially if a fairly large area of forest around the proposed site was first cleared and burnt and then kept clear and good deep wells sunk in order to obtain a pure supply of drinking water.

2nd.—The somewhat scanty labour supply in comparison with other localities in the district. But the labour is not so scanty as to prevent the establishment of works.

3rd.—The site is not situated near the railway, but would be at a distance of about 14 miles from it. If the Singarapet, Samalpatti and Trinamalai branch line was constructed, this distance would be reduced to eight miles, and it might then be possible to utilize Bengal coke in conjunction with wood. The coke might be landed at Cuddalore and railed to Singarapet and thence trammed to the works. It is evident, however, that the cost of carriage would in this case be considerable.

It now remains to consider the area of forests within a 16 and 25 miles radius of the works at Tirtamalai. I take a 25 miles advisedly, as it appears to me from a perusal of the papers now available that charcoal would bear the carriage for this distance. These forests and their areas are as follows:—

Forests within 16 and 25 miles of Tirtamalai.

Smelting centre.	Forests within 16 miles. Serial No.	Name.	Acre.	Forests within 25 miles. Serial No.	Name.	Acre.
Thirthamalai Centre.	1	Vellakal	863	1 to 36	As per forest within 16 miles	224,250
	2	Pudur Punguni	1,120	37	Nochikuttai	8,885
	3	Sundamalli	560	38	Kauramalai extension	2,768
	4	Govindapuram	2,304	39	Mukkanur A and B	2,060
	5	Singarapet	2,637	40	Mambakkam	10,816
	6	Eclavambady	3,838	41	Thumbal	3,670
	7	Puvampatti	5,286	42	Thumbal extension	1,800
	8	Puvampatti extension	1,544	43	Muttikottai	3,682
	9	Alambadi	512	44	Kudimaduvu	4,424
	10	Tirtamalai	16,294	45	Pungamaduvu	2,408
	11	Veppampatti	10,680	46	Pilappadi	5,441
	12	Kottapatti	11,561	47	Narthenchedu extension	973
	13	Chittingi	8,342	48	Bonthikal	294
	14	Chitteri	3,459	49	Bothakadu	2,822
	15	Chitteri extension	5,971	50	Kuttar	5,389
	16	Ammapalayam	10,578	51	Kuttar extension	1,472
	17	Kalnad	5,793	52	Narthenchedu	2,598
	18	Thombakal	9,608	53	Vellampatti proposed	4,890
	19	Pallippatti	11,193		Total	288,642
	20	Thombakal extension	5,563			
	21	Harur	1,679			
	22	Singarapet extension	5,939			
	23	Inner Javadis	32,090			
	24	Odasarakampatti	1,600			
	25	Morapur	5,982			
	26	Ponnagarapatti	3,769			
	27	Vattampatti	1,563			
	28	Poyyapatti	3,256			
	29	Onnakarai	3,665			
	30	Karangal	5,919			
	31	Kauramalai	8,512			
	32	Kallavi	4,160			
	33	Kottapatti extension proposed	14,816			
	34	Veppampatti do. do.	4,602			
	35	Chittingi do. do.	3,069			
	36	Nochikuttai do. do.	5,924			
		Total	224,250			

The above statement does not include any recently abandoned reserves.

Now as regards the average annual increment to be applied to these forests, I consider that this might amount to anything from half a ton to one and a half tons more especially considering the area includes a large area of bamboo forests and the forests of the moist Kottapatti valley. But as it is always advisable to underestimate rather than over-estimate in a matter of this sort, I think an annual yield of three-fourths of a ton per acre may be assumed for the whole area; this would mean an annual yield of 25,228 and 29,472 tons of charcoal, respectively, according as the 16 miles radius or 25 miles radius was adopted. This is after making a deduction of 25 per cent. for rocky and unworkable and poorly stacked portions.

As regards the cost of the supply of 1 ton of charcoal, I would estimate them as follows:—

	Rs.	A.	P.
Cost of billetting and felling, &c., 5 tons of wood at Rs. 1-8-0 per ton	7	8	0
General supervision of burning, &c.	0	8	0
Interest on outlay for rough cart-tracks	1	0	0
Carriage of 1 ton over average distance of 8 miles	1	12	0
Seigniorage	1	8	0
Sundries (loading and unloading)	0	8	0
Total	12	12	0

For the 25 miles limit, an extra Re. 1 should be added to the above cost of charcoal per ton.

Resolution—Forest No. 556, dated 18th December 1897.

In paragraph 4 (2) of Board's Proceedings, No. 361, dated 23rd September 1896, recorded with Government Order, No. 666, dated 24th November 1896, the Board called on the Conservator of Forests, Central Circle, to submit a revised estimate of the cost of supplying charcoal for iron-smelting at Kanjamalai in the Salem district and the annual supply available.

2. Since these proceedings were issued, Major Mahon has remarked in papers * recorded with Government Order, No. 24, dated 19th January 1897, that it is futile to expect an iron industry, in the proper acceptation of the term, to grow from any scheme for using charcoal fuel alone. This is true no doubt, and the Board has strongly advocated the propriety of carrying on the experiments with coal and iron ore recommended by Major Mahon, but there seems no reason why the possibility of the manufacture by charcoal fuel on a limited scale should not also be investigated and placed on record.

* Page 2, paragraph 2.

3. From Mr. Popert's letter and the other papers recorded above, it will be seen that so long as the Madras Railway burns wood fuel, the idea of manufacturing iron with charcoal at Kanjamalai must be abandoned, as no iron industry could afford to pay for fuel prices now paid by the Madras Railway. Consideration must therefore be to the fuel resources available in the neighbourhood of Tirtamalai, where enormous beds of rich iron ore are also to be found (*vide* page 10 (5) of Handbook No. 8, Iron—Imperial Institute Series). The portions of the papers forwarded by the Conservator which relate to the Kanjamalai forests alone have been omitted from the printed record.

4. From Mr. Popert's letter it will be seen that, after making large deductions from the District Forest-officer's estimate of the amount of wood available and adding to his estimate of cost wherever any room for doubt exists, he is satisfied that an annual supply of 12,000 tons of charcoal could be brought to the Tirtamalai beds from forests within a radius of 16 miles at a cost of Rs. 14-12-0 per ton. For every ton of charcoal, however, about 15 cwt. of firewood is also necessary, so the available yield of the forests may be taken at 10,000 tons of firewood to be used as fuel and 50,000 tons to be made into 10,000 tons of charcoal, the amount required for an annual outturn of 10,000 tons of pig iron.

5. The cost price of charcoal pig iron put f.o.b. at Madras was estimated by Mr. Jeremiah Head as follows †:—

† Page 17 of Board's Proceedings, No. 361, dated 23rd September 1896.

	Rs.	A.	P.
1. Iron ore 1 ton 17 cwt. at Rs. 3	5	8	10
2. Charcoal 1 ton at Rs. 24	24	0	0
3. Limestone 5 cwt. at Rs. 3	0	12	0
4. Firewood 15 cwt. at Rs. 4	3	0	0
5. Stores and renewals	3	0	0
6. Wages and salaries	17	0	0
7. Delivery to Madras 200 miles at 6 pies per ton per mile	6	4	0
8. Agent at port	1	4	0
9. Putting f.o.b. at port	1	4	0
10. Establishment charges	4	0	0
Total	66	0	10

6. These figures have already been criticised by the Board, but they will be dealt with again as the Board has since had the advantage of reading Major Mahon's remarks printed in Board's Proceedings, No. 24, dated 19th January 1897.

Item No. 1—*Iron Ore.*—Mr. Head has taken the price at Beypore, which includes carriage by boat. It may, however, be accepted as Major Mahon points out that Mr. Head's estimate for collecting and picking is very low.

Item No. 2—*Charcoal.*—For the reasons given above, the charges on account of this item may be reduced to Rs. 14-12-0, including supervision and a seigniorage of Rs. 2-8-0 to Government being at the rate of As. 8 per ton of wood used.

Items Nos. 3, 4 *and* 5 may be accepted.

Item No. 6—*Wages and Salaries.*—In paragraph 4 of its Proceedings, No. 361, dated 23rd September 1896, the Board pointed out the impossibility of accepting anything approaching the estimate made by Mr. Head for wages and salaries. Major Mahon * would reduce it to Rs. 2-6-5 for works carried on on a very large scale, and points out that the cost of wages was estimated for the Barrakur steel works project at Rs. 3-8-0 to Rs. 2-12-0 per ton including officials. The supervision charges would probably be high in works on the comparatively small scale under consideration, but twice the amount estimated for Barrakur or Rs. 7 would probably be ample.

* Page 3 of Board's Proceedings, No. 24, dated 19th January 1897.

Item No. 7—*Rail to Madras.*—Mr. Head takes the rate of carriage to Madras at 6 pies per ton, but in his letter recorded in Board's Proceedings, No. 1275, dated 5th April 1897, the Agent of the Madras Railway has reported that pig iron in 12-ton wagon loads can be carried at 3 pies per ton per mile. The charge for this item must therefore be reduced to Rs. 3-2-0.

Item No 8.—Major Mahon points out that the item "Agent at port" is unnecessary and should be included in establishment.

Item No. 9.—This may be accepted.

Item No. 10.—*Establishment.*—The Board has already remarked that the cost of office establishment in Madras or London should be much less than Rs. 4 per ton, which would be Rs. 40,000 or Rs. 3,333-5-4 per mensem in the case of works with an annual outturn of 10,000 tons. Rs. 2 would no doubt be ample for items 8 and 10 together.

7. If the works were situated at Thirthamalai instead of at Kanjamalai, a further sum of Rs. 1-12-0 per ton would have to be added for the carriage of pig iron 14 miles to the railway station.

8. The Board's estimate of the cost price of charcoal pig iron put f.o.b. at Madras would thus be—

	Rs.	A.	P.
Iron ore—P-1	5	8	10
Charcoal	14	12	0
Limestone	0	12	0
Firewood	3	0	0
Stores and renewals	3	0	0
Wages and salaries	7	0	0
Carriage to railway station	1	12	0
Rail to Madras	~~3~~	~~2~~	0
Putting f.o.b. at Madras	1	4	0
Establishment	2	0	0
Total	~~42~~	~~2~~	~~10~~

9. As the law at present stands, the rate of exchange is not likely ever materially to exceed 1*s.* 4*d.* per rupee, so the Board's estimate of putting a ton of charcoal pig iron f.o.b. at Madras may be taken at ~~£2-16-6~~, and adding to this 15 shillings per ton for freight it would be possible to deliver it in London at ~~£3-11-6~~, while the value per ton of Swedish pig iron delivered at a British port is stated by Mr. Head to vary from £4-1-0 to £5-0-9. It would also compete on favourable terms with Hematite pig imported into India, the average cost at Madras being † £3-3-6.

† Page 17 of Board's Proceedings, No. 361, dated 23rd September 1896.

(True Copy and Extract.)

(Signed) R. C. C. CARR,
Secretary.

To the Secretary to Government, Revenue Department, with tracing.

Order—No. 168, Revenue, dated 22nd March 1898.

Miscellaneous.

The Proceedings of the Board of Revenue, read above, will be placed at the disposal of the Press and also be published in the *Fort St. George Gazette*.

2. The following despatch will be forwarded to the Right Honourable the Secretary of State for India in reply to His Lordship's despatch No. 10, dated the 2nd July 1896.

(True Extract.)

(Signed) G. S. FORBES,
Ag. Secretary to Government.

To the Board of Revenue (Land Revenue).
„ the Editors' table.
„ the Superintendent, Government Press.

Endorsement No. 168A.

Copy to the Government of India, Revenue and Agricultural Department.

(Signed) N. E. MARJORIBANKS,
Ag. Under Secretary to Government.

Er I. Sheik Karim.

80 Copies.

FORT SAINT GEORGE.

REVENUE (1898) *DEPARTMENT.*

(Copy.)

Letter to the Right Honourable the Secretary of State for India.

No. 3 dated 24th March 1898.

Informing the Right Honourable the Secretary of State for India of the views of this Government on the conclusions arrived at by Mr. Jeremiah Head in his report on the practicability of working the iron ores of the Salem district.

REVENUE DEPARTMENT.

To

The Right Hon'ble the SECRETARY of STATE for INDIA.

My Lord,

We have the honour to reply to your Lordship's despatch No. 10, dated the 2nd July 1896, in which your Lordship desired to be informed whether we concurred in the conclusions arrived at by Mr. Jeremiah Head in his report on the practicability of working the iron ores of the Salem district in this Presidency.

2. As observed by your Lordship in paragraph 2 of the despatch under reply, Mr. Head has no doubt thoroughly gone into the question referred to him for opinion. He is of opinion that it would not be commercially profitable either to export the iron ore in bulk to England or to manufacture iron and steel on the spot or in Salem, with charcoal from the neighbouring forests or with coke from the Singareni or Barrakur coal fields.

3. Before, however, expressing our opinion as to the soundness of the above conclusions, we deemed it desirable to consult the Board of Revenue and to cause Mr. Head's premises and arguments to be carefully scrutinized. In its Proceedings, dated the 23rd September 1896, No. 361, the Board of Revenue observed that it was necessary to invite further discussion and to call for further information before some of Mr. Head's important conclusions could be accepted as satisfactorily established. Taking the fourth conclusion in the summary at the end of Mr. Head's report, namely, that it would be impossible to manufacture charcoal pig-iron in the Salem district under Rs. 66-0-10 per ton, the Board of Revenue pointed out that some of the items of charges which Mr. Head had included in this estimate might possibly be cut down, and that charcoal iron might be produced in Salem at a figure much below Mr. Head's estimate. We thereupon awaited the further information on this point which the Board had called for and, in the meantime, ordered the correspondence on the subject to be placed at the disposal of the Press and also to be published in the *Fort St. George Gazette*, in order to afford an opportunity to those who might be interested in, or have special knowledge of, the matter, to freely discuss the questions at issue.

4. In December 1896, we received from the Government of India copies of report by Major Mahon, R.A., Superintendent, Foundry and Shell Factory at Cossipore on the manufacture of iron and steel in India, and of a letter from the same officer which he traversed Mr. Head's conclusions on the question of working the Salem iron ores. Major Mahon admitted that Mr. Head was correct in considering that the proposal to export the Salem ore to England was out of the question. He stated that "it was equally futile to expect an iron industry, in the proper acceptation of the term, to grow from any scheme for using charcoal fuel only," and that "in no country and under no conceivable circumstances could charcoal fuel form anything but a subsidiary adjunct to that required for iron industry proper." Taking, however, the question of the manufacture of pig-iron with Indian coke, which was disposed of by Mr. Head

in the closing paragraph of his report, as not likely to improve the chances of success, Major Mahon pointed out that some of the figures adopted by Mr. Head were erroneous and that pig-iron could possibly be manufactured at Calcutta, out of the Salem ores, with coke from Bengal coal, at a cost of Rs. 45-15-1 per ton, as against Mr. Head's estimate of Rs. 66-0-1 per ton of charcoal pig; and accordingly, while strongly supporting the proposal referred to in paragraph 3 of your Lordship's despatch, to send 300 tons of Salem ore to England to Messrs. Bolchow, Vaughan & Co. of Middlesborough-on-Tees for experimental purposes, he recommended that 600 tons of Bengal coal of a quality equal to the Sanctoria coal should also be despatched to the above firm, to be coked by them and used in the reduction of the Salem ore, so that a trustworty forecast might be made of the quantity of fuel and flux and further information of value obtained as to the size of blast furnace which would be suitable.

5. On perusing Major Mahon's communications and after consulting the Board of Revenue, we considered that reasonable grounds existed for subjecting Mr. Head's recommendation regarding the manufacture of pig-iron with Indian coke, to a practical experiment on a large scale, as suggested by Major Mahon. We therefore, in March 1897, solicited the sanction of the Government of India to the despatch of 300 tons of Salem ore and 600 tons of Bengal coal to Messrs. Bolchow, Vaughan & Co. for the purpose of determining by experimental manufacture the value and cost of production of pig-iron made from Indian ore with Indian coke.

6. The Government of India, after some correspondence with your Lordship, have decided that two tons of Salem ore and 105 tons of Sanctoria coal should be sent to England for a preliminary experiment. The two tons of iron ore were shipped from Madras per S.S. *Rewa* on the 9th ultimo and the 105 tons of coal were shipped from Calcutta per S.S. *Golconda* on the 8th instant. We await with interest the results of the proposed experiment.

7. The further information called for by the Board of Revenue in order to examine Mr. Head's estimate of the cost of manufacturing charcoal pig-iron in Salem, having been since received and reviewed by the Board of Revenue in its Proceedings, No. 556 F., dated the 18th December 1897, of which a copy is herewith enclosed, we are now in a position to deal *seriatim* with all the conclusions except the seventh recorded in the summary at the end of Mr. Head's report.

8. *The first and second conclusions.*—These are merely statements of facts and call for no remarks.

9. *The third conclusion.*—We are now led to consider that this must be taken to be established. Assuming that the Salem ore contained about 63 per cent. of iron on the average, and taking the rate of exchange at Rs. 16-7-0 per sovereign, Mr. Head, it will be seen, arrived at the result that the proposal to export the ore to England involved a loss of Rs. 3-11-0 per ton. The assumptions, however, regarding the richness of the Salem ore and the rate of exchange would seem to require correction now. Mr. Middlemiss of the Geological Survey recently inspected the iron-ore beds of the Kanjamalai Hills in Salem and examined several specimens of ore found at different spots and reports that the average yield of iron from the ore is not likely to exceed 40 per cent. and that the richness of the ore has been over-estimated. The exchange value of the rupee has also risen since the date of Mr. Head's report, the current rate of exchange being Rs. 15-4-0 per sovereign as against Rs. 16-7-0

adopted by Mr. Head. The prospect of exporting the ore in bulk to England with commercial success has, therefore, evidently become decidedly unfavourable.

10. *The fourth, fifth, sixth and eighth conclusions.*—With regard to these, we have already stated that the attempt to develop an iron industry in Salem with the aid of charcoal fuel alone, having been condemned by Major Mahon, steps have been taken to investigate the feasibility of working the ore with Indian coke. At the same time, however, as observed by the Board of Revenue in paragraph 2 of its Proceedings, No. 556, dated the 18th December 1897, the results of the inquiry into the possibility of working the ore with charcoal *on a limited scale* may as well be placed on record. Your Lordship will observe from the Board's Proceedings above quoted, that the provision of a constant supply of charcoal to work the Kanjamalai ores at the Kadiampatti centre, which was contemplated in Mr. Stokes' memorandum printed in pages 13—18 of G.O., No. 420, dated 4th July 1895, has since become impracticable on account of the continued and increasing demand for wood fuel at Salem by the Madras Railway, but that there is a fair prospect of working the Tirtamalai beds with charcoal from forests within a radius of 16 miles, and that there is fuel available for an annual outturn of 10,000 tons of pig-iron. Mr. Head's estimate of the cost of manufacture of charcoal pig-iron at Salem has been revised by the Board of Revenue in the light of the more recent information, and it will be seen that the cost, which was fixed by Mr. Head at Rs. 66-0-10, is estimated by the Board of Revenue at Rs. 42-2-10. Your Lordship will thus see that Mr. Head's fourth, fifth, sixth and eighth conclusions cannot be accepted as established. On the contrary, there seem to be reasonable grounds for estimating that charcoal pig-iron manufactured at Salem could be put on the English market at £3-11-[illegible] per ton, taking the rate of exchange as not exceeding 1*s.* 4*d.* per rupee. According to Mr. Head, Swedish pig-iron is imported into England at rates varying from £4-1-0 to £5-0-9; and Hematite pig-iron is imported in Madras at the average rate of £3-3-6 per ton.

We have the honour to be,
My Lord,
Your Lordship's most obedient and humble servants,

(Signed) A. E. HAVELOCK.
(„) H. W. BLISS.
(„) J. GROSE.

Fort St. George,
24th March 1898.

Ed. W. D'Mos.