M.R.O. 14-5,460—22-10-25.

MADRAS RECORD OFFICE.

Government of Madras.

Revenue **DEPARTMENT.**

G.O. No. 1436 Press Mis.

401 402

Dated 28-6-1867.

Not to be folded or roughly handled

Proceedings of the Madras Government, Revenue Department,
28th June 1867.

No. 401. Read the following Proceedings of the Madras Government in the Financial Department:—

Declining to sanction any change in the method of assaying at the Madras Mint, and deputing the Superintendent of Stamps to enquire and report into the Office work of the Assay Department. } (Here enter 18th June 1867, No. 264.)

No. 402. ORDER THEREON, 28th June 1867, No. 1,436.

Miscellaneous.

Communicated to the Board of Revenue.

(True Extract.)

(Signed) J. GROSE,
Under Secretary to Government.

To the Board of Revenue, with Proceedings Financial Department, No. 264.

Encl. S. T. Augustin.

Proceedings of the Madras Government, Financial Department, 13th June 1867.

No. 44. Read the following letter from the Mint Master, to the Chief Secretary to Government, Fort Saint George ; dated Madras, 23rd March 1867, No. 392.

In submitting letter,* as per margin, from the Acting Assay Master, proposing to assimilate the method of assaying and system of notation to those in use in the Calcutta and Bombay Mints, at an increased expenditure of Rupees 108 *per mensem*, I have the honor to state, that although, as observed by the Assay Master, the present time, when work is slack, is suitable for introducing a new system, it is very undesirable to incur any *extra* expense at a time when there is no income from seignorage to cover it.

* No. 226, 7th March 1867.

2. The chief reason for the change is to secure uniformity of practice with the other Mints, as suggested some time ago by the Assay Master at Calcutta, and approved of by the Government of India ; but as regards the accuracy of the coinage there is no necessity for a change, as the Madras Rupee coinage for any number of years will bear comparison, both in regard to accuracy of weight and of fineness, with that of the other Indian Mints, although all the operations of the coinage are regulated by the old method of assaying, called the cupellation process, and which, I may here observe, is still in use by the "Queen's Assayer" in the Royal Mint in London.

3. I have also to notice prominently, that while the present system of reporting on merchants' bullion is so favorable for the purchaser, that is, the Mint, that the settlement accounts show a positive gain to Government of Rupees 1-1-6 in each thousand tolas, with the introduction of the new system of assay a direct loss must be expected, and which the Commissioners of Inquiry into Indian Accounts state in their first Report to amount to a quarter *per cent.* in the Calcutta Mint.

4. In regard to the increase of expenditure, considering that, in the proper acceptation of the term accounts, there are really none kept in the Assay Office, and that the most important part of the office work is an arithmetical calculation of the value of each tender following on the assay, and which when made for the day has never again to be referred to or thought of, I consider that the Head Accountant of the Assay Office is very handsomely paid by his present salary of Rupees 200 a month, and that it is not only unnecessary, but very inexpedient, to raise his salary to that of the Head Accountant in the Mint Office, who is responsible for the correctness of an elaborate and extensive system of accounts, which are only closed once in six months. Moreover, the present Head Accountant of the Assay Office has not the same claim as his predecessor, lately deceased, had. Eleven months ago his salary was 70 Rupees a month, from which he was promoted in May last to 100 Rupees a month, as Superintendent of the Die Department in the Mint, and after the short period of five months was re-transferred to the Assay Office in his present situation on 200 Rupees a month.

5. With respect to the Assay Office generally, I have long thought that its establishment was needlessly large, but it is only now I have become acquainted with its actual extent, and I have no hesitation in asserting, that several of the hands maintained in the office for clerical work might be dispensed with.

6. The existing Office establishment in the Assay Department is—

1	Assay Master.
1	Deputy.
2	Accountants.
3	Writers.
7	Total.

7. In the Mint Office it is—

1	Mint Master.
6	Accountants and Book-keeper.
3	Writers.
10	Total.

and yet the clerical work of the Mint Office is certainly *twenty*, perhaps *thirty*, times as much as that of the Assay Office.

8. It is true that the work in the Assay Office is not constant, but I hesitate not to say that, assuming the Assay Master and his Deputy to do the delicate parts of the practical assay, and to make or verify the calculation of value of tenders, the clerical work of the Assay Office is not, at the busiest time of the year, more than one good Clerk or Accountant could conveniently perform, and that a Deputy Accountant is only absolutely requisite to be maintained in case of the absence, from sickness or other cause, of the Head Accountant, while the whole staff of Writers is altogether unnecessary.

9. It is with great reluctance that I make this report, as it has an invidious appearance; but, while admitting that the Assay Office is an independent one, and very properly so, I cannot be blind to the fact that all its expenses are charged to the Mint, and now that the matter has come before me, I feel I should be neglecting my duty if I did not express my opinion. I cannot expect the Assay Master to concur in my opinion, especially as he is an Acting Officer, and would naturally conclude that the establishment he found in existence must be requisite, and I would, therefore, propose that an Officer, familiar with accounts and office work, should be deputed to inquire into the office work of the Assay Department, and to report what establishment he would consider requisite for the prompt despatch of the work at the busiest time of the year, viz., any month in which the importation of bullion is greatest, and the manufacture of coin largest.

From the Acting Assay Master, to the Mint Master; dated Fort Saint George, 7th March 1867, No. 226.

I have the honor to request that you will submit the following circumstances for the consideration of Government.

2. In the month of September 1865, it was directed by the Government of India (at the suggestion of the Assay Master of the Calcutta Mint), that the decimal form of notation should be used in all Assay reports, recording the fineness of bullion, both gold and silver.

Vide G. O. G. G., dated Simla, 7th September 1865, No. 2253.

3. Dr. Shaw, the Assay Master of this Mint, shortly afterwards went to Europe on Medical Certificate, leaving, for the guidance of the Officiating Assay Master, a Memorandum,* explaining why he did not immediately give effect to this change.

* Appendix A.

4. Since Dr. Shaw's departure till very recently, I have been alone in this Assay Office, (which, moreover, sustained a loss by the death of Mr. VanDerwart, for many years its Manager and Head Accountant), and being thus short-handed, I did not think it judicious to take any steps towards the introduction of so radical an innovation as that recommended by my predecessor, involving as it would close and constant supervision in the Laboratory, while the subordinates were being trained to the manipulation of the new process; but now that an (Acting) Assistant Assay Master has joined the office, I deem it my duty to no longer defer soliciting sanction for measures which appear necessary for carrying out the above order of Government.

5. In this Mint the assay of silver is, as you are aware, effected by the method of cupellation, and the Assayer determines the fineness to the half pennyweight, viz., to the $\frac{1}{480}$th part, the

Assay report stating what is the variation of the bullion from the "standard" of the country, and not (directly) the amount of pure silver in it.

6. The lowest denomination of the report is, as above said, half pennyweight or 12 grains in the Pound Troy; closer than this in the Madras Mint (and I believe such is the usage, wherever the dry method is in force) it has never been deemed expedient to report the assays for the valuation of merchants' bullion, chiefly because the cupellation process is well known to be far from perfect, and gives results (even in the hands of the most skilful and experienced manipulators) which can only be regarded as approximate and conjectural.

7. The results, therefore, "being uniformly accurate *only* to within certain limits of error" it is the custom to protect the buyer of bullion (viz., in this country, the Mint) by the above latitude in the Assay report, which in some degree indemnifies him, as it were, against two principal sources of error, viz., average unavoidable imperfection in the assay, and irregularity of mixture of alloy in the bullion.

8. Creditably as this system has worked on the whole (judging it at least from one point of view, viz., the annual Pyx Reports on the Madras Coins), still the decimal plan of notation, which has for some years superseded it on the Continent, and which prevails in the Calcutta and Bombay Mints, is no doubt a great improvement, as simplifying matters generally, dispensing with two different forms of notation, one for silver, another for gold, and doing away with all reference to this or that "standard," the Assay report simply stating the amount of precious metal in 1000 parts of any alloy.

9. To enable the Assayer to report as closely as this, with that degree of accuracy desirable, where selling and buying bullion are involved, it will be necessary to resort to a process of assay which will give results more reliable than those afforded by cupellation, and that known as the "Chloride process," which has for some years been admirably working in the Calcutta and Bombay Mints, is the one best adapted in this country for the end in view.

10. The superiority of this method, and the desirability of its introduction, have been already so fully brought to the notice of Government in an exhaustive report from Dr. Shaw in 1856, that I cannot do better than beg to refer Government to it, with the Order of Government thereon, dated 7th April 1857; extracts from it, pointing out the chief characteristic differences of the processes, and embodying his recommendations, are appended* to this letter for facility of reference.

Financial Department, No. 209.

* Vide Appendix B.

In Dr. Shaw's last Memorandum,† he again impresses the desirability of a change of system, and recommends that the change of notation and in the method of assay, should be made together, and in this recommendation I fully concur, believing as I do that the one cannot be efficiently made without the other.

† Appendix A.

11. In anticipation, therefore, that Government will be pleased to sanction the introduction of this process, and so secure uniformity in the three Indian Assay Offices, I beg to submit an estimate of the probable increase of establishment which will be necessary.

In framing this estimate,‡ I have had before me the Calcutta Assay Office list,§ recently furnished, and the recommendations of Dr. Shaw in his report‖ in 1856, and his Memorandum¶ last year. I have endeavoured to be as economical as practicable, considering the peculiar elements of the present establish-

‡ Appendix C.
§ Appendix D.
‖ Appendix B.
¶ Appendix A.

ment, the difficulty of remodelling it, and the amount of extra work which will be thrown on it by the proposed arrangement.

12. There is not in this as in the Calcutta Assay Office an Accountant's establishment as distinct from a Laboratory one, the custom having grown up of the two senior Accountants (in addition to their more legitimate work) aiding in the preliminary weighings and manipulations of the assays; the Superintendents of Musters also taking part in a minor degree in the simpler operations. Though this system is not the best, (it being desirable, as a rule, that Laboratory work should be in the hands of assistants trained to it alone), still it is the best within reach, and an extension of it seems to me the most feasible and economical plan at present, circumstances and vested interests being considered.

I propose, therefore, to carefully train and practice all the subordinates under my immediate supervision in the Laboratory, so as to enable them to take part in the manipulations and be generally useful; and as the Laboratory work in the Chloride process is much greater, and more delicate and tedious than in cupellation, I have recommended extra pay for extra work.

13. As it would be desirable to have some one training up in the office to succeed by and bye to the senior posts, I beg further that sanction be allowed for an apprentice; an intelligent East Indian lad, who had passed the required Uncovenanted Civil Service Examination, might be entertained on a salary of (25) twenty-five Rupees monthly, and to make it worth his while to remain after being trained, I would recommend that his pay be yearly increased by 5 Rupees till it reached (45) forty-five Rupees; this is the only additional assistant that I have estimated for: a good portion of his pay will be met by a reduction in the furnace-room expenses, when the new process shall have been sufficiently established to enable us to dispense with the dry method; but of course at first the two systems must go on together, till the subordinates are thoroughly acquainted with the new.

14. In conclusion, I beg to say that now, while work is very slack, (owing to the present small importation of bullion), is the most favorable opportunity for commencing a process, the introduction of which must necessarily be gradual; also that it would greatly facilitate the introduction, if this office were empowered to send some one to Calcutta to see the Chloride process worked on a large scale. Though we frequently use it in this Assay Office, it is in a very limited way, chiefly as a confirmatory test for the satisfaction of the Assay Master, where more than ordinary precision is desired, and an intelligent, observant person, with some previous knowledge, could not but pick up some hints, and gain much valuable information as to detail, were he afforded an opportunity to see the system in extensive operation in a Mint, where they have had ten years' additional experience of it since Dr. Shaw wrote his report in 1856.

Should Government be pleased to sanction this suggestion, which I regard as most essential, I beg to recommend Mr. Duarte, the present Manager of the Office, as the most suitable person, and to solicit for him leave of absence for three months, with full pay (to be drawn in Calcutta), and a free passage there and back. The experience which he would acquire, by a six or eight weeks' attendance in the Calcutta Assay Laboratory, would render him a valuable aid to me in drilling the subordinates in the necessary manipulation.

15. As much of the necessary apparatus for the new process was provided when this subject was last mooted, I do not anticipate that it will be necessary to incur much further expense under this head, but I should be in a better position to give an opinion on this point after the Manager's return from Calcutta.

APPENDIX A.

Memorandum for the Officiating Assay Master, dated 12th March 1866.

On relinquishing my office, I think it right to place on record, for the information of my successor, a few points requiring his immediate attention.

2. It has been recently directed by the Government of India, that the decimal system should be used in preference to the old method by pennyweights, both in the valuations of the Assay Office and the Mint. I have not as yet given effect to this change in my office, as it seems to me very desirable that it should be done synchronously with the full introduction of the Chloride process of assay, which has hitherto been only partially in use; the current work being still carried on by cupellation. I was very anxious, some years ago, entirely to supersede cupellation by the new method, but there were difficulties in the way, owing to the different establishment we have in Madras from that of Calcutta, and the necessity of entirely remodelling it at some additional cost, and at the same time of providing for the old and valuable employés in the office. The question was referred to Government at that time (vide correspondence in the office), who declined to sanction any extra outlay, and the whole matter has remained since then in abeyance; the Annual Pyx Reports shewing no marked superiority in the assays of the other Indian Mints as compared with our own. I think, however, the time has now arrived when the change may be introduced with practical advantage in connection with the new system of reporting the out-turn of the Mint in decimals.

No. 111.
To Mint Committee, 5th March 1857.
From do do. 21st April ,,
To do. do. 17th March ,,
Extract Minutes of Consultation, 7th April 1857.
To Mint Committee, 26th May 1857.

3. Mr. G. D. VanDerwart, the Head Accountant, has for some years taken an active part in the work of assaying, and is most pains-taking and trustworthy. I think he should be made Superintendent of the Laboratory, on a salary of at least Rupees 250 per mensem.

4. Mr. Duarte is also a most useful and deserving man, and has always given his aid cheerfully in carrying on the general work of the office, in addition to his own proper duties as the Deputy Accountant. I think he should receive a salary of Rupees 100 per mensem as 1st Assistant in the Laboratory and Deputy Accountant, if it should be still considered desirable to retain the Accountant's Office on its present footing.

5. It would also be advisable to have a young man trained in the Laboratory as an apprentice, to learn thoroughly the art of assaying and to succeed to the higher posts. I would recommend Mr. VanDerwart's son, an intelligent youth now employed as a writer in the office, who has passed the required examination, as a fit person for this situation on a salary of Rupees 30 per mensem.

6. When these changes are made the present establishment of furnace-men will not be required, and some saving may be effected in this Department, though it will still be necessary to have one or two furnaces and firemen for coarse silver and parting assays of gold. Some contingent servants, as the Mouthcoal maker, &c., may also be dispensed with, as they will but seldom be required.

7. The Superintendents of Musters are more highly paid than the same class of servants in Calcutta. Soobaroyaloo is the son of a very old servant, and has been employed for several years. He is very steady and attentive. His Assistant has passed the prescribed examination, and is a very intelligent well-behaved youth, who would no doubt be very useful also in the Laboratory, if taught the work.

8. Of the three Peons employed in the office, two, Permall and Rungiah, are becoming old and infirm, and it would be very desirable to obtain younger and more efficient men in their stead, if any provision in the way of pension can be assigned to them; they have been very honest and

faithful in the discharge of their important duties, having large sums of money constantly entrusted to their charge, and are deserving of every consideration.

(Signed) G. J. SHAW, M. D.,
Assay Master.

(True Copy).
(Signed) H. E. BUSTEED, M. D.,
Acting Assay Master.

B.

Extracts from a letter from Dr. G. J. SHAW, Assay Master, to the Mint Committee, dated 4th March 1856.

I have the honor, in compliance with the instructions of Government, conveyed in your letter dated 24th November 1855, with Extracts from Minutes of Consultation, to lay before you the result of my inquiries into the comparative merits of the processes of assay, as practised in the Mints of Calcutta and Madras.

2. In the brief period to which I was of necessity limited during my recent visit to Calcutta, it was impossible to conduct an extended experimental investigation into the comparative advantages of the Chloride process over the humid method known by the name of the eminent Chemist Guy Lussac, and adopted in the Mint at Paris; but I believe it to be the decided opinion of my colleagues, as it is my own, that the former method, for the introduction of which we are indebted to the scientific knowledge and mechanical skill of Mr. Dodd, the late Assay Master of the Calcutta Mint, is the one best adapted to the Mints in India, while both processes are greatly superior in accuracy to the more ancient and ordinary method by cupellation practised in the Mints of Madras and Bombay.

3. I shall endeavour to lay before your Committee, as briefly as possible, the chief points in which these various processes differ from each other, and the grounds on which I consider the Chloride process entitled to preference, should it be deemed advisable to introduce an uniform system of assay into the Indian Mints.

4. In cupellation, or the dry method of assay, the chief difficulties arise from the variation of the absorption of the pure silver into the cupels, or what is termed the "Cupel allowance," which depends upon the quantity of oxidizable metal with which it may be combined, and the amount of heat employed in its reduction. These unavoidable sources of error can only be ascertained and provided against by the results of long experience, and even when all the practical difficulties are known and carefully met, an approximate result can only be obtained in place of a rigid chemical analysis. In Mr. James Prinsep's valuable experiments, on the subject of "Cupel allowance," a quarter of a dwt. or 6 grains is the minimum of variation that could be attained with the utmost exactness in manipulation. The humid process on the contrary being based on definite chemical laws, is in a great measure independent of the operator, and affords results at once uniform and strictly to be relied upon.

* * *

6. The Chloride process, introduced by Mr. Dodd into the Calcutta Mint, is at once the most scientific and the most elegant method of ascertaining the true value of silver alloys with which I am acquainted, and is altogether free from the sources of error to which I have adverted. It is based upon the same chemical principle as the humid process of Guy Lussac, viz, the definite proportion in which Chlorine unites with silver, but differs from it in the calculation being made from the precipitate itself, when carefully collected, freed from moisture and weighed. By this method reports can be made to a single grain, or, to speak more accurately, to 1½ grains Troy, which has been the practise in the Assay Office at Calcutta for some years past, where the system has been confidently adopted, and gradually perfected.

* * *

10. Having thus as succinctly as possible laid before your Committee the chief points of superiority which the Chloride process possesses over the other recognized method of assay, it only remains for me, in the event of its being adopted in the Madras Mint, to suggest that one or more steady intelligent lads should be sent to make themselves thoroughly acquainted with the practical details of the process in the Laboratory of the Assay Office in Calcutta, as its successful introduction must altogether depend upon careful manipulation, which could only be acquired in working for three or four months diligently on the large scale, and with the complete apparatus employed there.

* * *

(True Extracts).
(Signed) H. E. BUSTEED, M. D.,
Acting Assay Master.

PUBLIC

Number.	Date.	Office to which the proposition refers.	Nature of Charge.	Present Scale.	RS.	A.	P.	Proposed Scale.	RS.	A.	P.	Permanent Increase per mensem. RS.	A.	P.
		Assay Office.	*	1 Head Accountant and Manager	200	0	0	1 Head Accountant and Superintendent of Laboratory	250	0	0	†		
				1 Deputy do.	70	0	0							
				1 Writer	30	0	0	1 Second Accountant and Assistant do.	100	0	0			
				1 Do.	25	0	0							
				1 Do.	14	0	0	1 Head Writer and do.	40	0	0			
				1 Moochee	12	0	0	1 Second do. and do.	30	0	0			
				3 Peons, at 7 Rs. each	21	0	0	1 Third do. and do.	17	0	0			
				1 Superintendent of Musters	30	0	0	1 Superintendent of Musters	35	0	0			
				1 Assistant do.	15	0	0	1 Assistant do.	18	0	0			
				1 Head Fireman	28	0	0	1 Laboratory Apprentice	25	0	0			
				1 First Assistant	10	0	0							
				1 Second do.	8	0	0	1 Mooche	12	0	0			
				1 Third do.	7	0	0	1 Flattening man	10	0	0			
				1 Flattening man	10	0	0	1 First Fireman	15	0	0			
				1 Sweeper	3	8	0	1 Second do.	8	0	0			
				1 Scavenger	1	0	0	1 Laboratory man	7	0	0			
								3 Peons, at 7 Rs. each	21	0	0			
								1 Sweeper	3	8	0			
								1 Scavenger	1	0	0			
				Total	484	8	0	Total	592	8	0	108	0	0

* On this establishment there devolves also the duty of correcting and adjusting all weights and measures, a duty for which, I believe, in the Calcutta Mint a separate establishment is maintained.

† Vide Dr. Shaw's Memorandum, paragraphs 3 and 4.

FORT SAINT GEORGE,
H. M.'s ASSAY OFFICE,
7th March 1867.

C.

DEPARTMENT.

Proposition. Permanent. Decrease per mensem. RS.	A.	P.	Temporary. Increase per mensem. RS.	A.	P.	Period.	Decrease per mensem. RS.	A.	P.	Period.	Casual or Extraordinary.	Grounds of Proposition.	Local Government's recommendation.	Orders of the Government of India. Home Department. Remarks.	Financial Department. Remarks.	Financial Department. Orders.
												For the introduction of the new system of Assay by the Chloride process.				

(Signed) H. E. BUSTEED, M. D.,
Acting Assay Master.

D.

STATEMENT of the fixed Establishment of the Calcutta Assay Office in 1856 and in 1867, showing the increase in eleven years.

Establishment in January 1856.				Establishment in February 1867.				Remarks.
Designation of Office.	Salary.			Designation of Office.	Salary.			
	RS.	A.	P.		RS.	A.	P.	
Foreman or Head Uncovenanted Assistant	200	0	0	Head Assistant..... 250 / Personal allowance.... 100	350	0	0	
European Apprentice	50	0	0	2nd Assistant, rising to Rupees 150	120	0	0	
				3rd do.	50	0	0	
Head Accountant and Writer	45	0	0	Head Writer	55	0	0	
2nd do. do.	28	0	0	2nd do.	28	0	0	
3rd do. do.	16	0	0	3rd do.	20	0	0	
				4th do.	16	0	0	
Head Muster Sircar	40	0	0	Head Muster Sircar	40	0	0	
2nd do. do.	14	0	0	2nd do.	15	0	0	
Duftry or Stationer	8	5	9	Duftry	8	0	0	
1st Weighman	15	0	0	Head Weighman	30	0	0	
2nd do.	10	0	0	2nd do.	15	0	0	
				3rd do.	10	0	0	
				4th do.	10	0	0	
First Laboratory Assistant	8	0	0	1st Laboratory Man	9	0	0	
2nd do.	6	0	0	2nd do.	9	0	0	
3rd do.	6	0	0	3rd do.	9	0	0	
				4th do.	8	0	0	
				5th do.	6	0	0	
				6th do.	6	0	0	
Head Muster Melter	5	0	0	Muster Melter	9	0	0	
2nd do.	4	0	0	1st Hammer Man	6	0	0	
3rd do.	4	0	0	2nd do.	6	0	0	
				3rd do.	6	0	0	
Armourer	10	7	2	Armourer	10	0	0	
Head Bearer	6	0	0	Head Peon	7	0	0	
Peon	5	0	0	2nd do.	6	0	0	
				Furrash	6	0	0	
2nd Bearer	4	0	0	Bearer	4	0	0	
Bheasty	4	0	0	1st Bheasty	4	0	0	
				2nd do.	4	0	0	
				3rd do.	4	0	0	
Sweeper	4	0	0	Sweeper	4	0	0	
Total	492	12	11	Total	890	0	0	

(Signed) H. E. BUSTEED, M. D.,
Acting Assay Master.

No. 45. ORDER THEREON, 18th June 1867, No. 264.

Under the opinion expressed by the Mint Master, in which the Government concur, the Governor in Council must decline to sanction any change in the method of assaying at the Madras Mint.

2. The Government resolve to depute V. Ramiengar, Superintendent of Stamps, to inquire into the Office work of the Assay Department, and report what establishment he considers necessary for the prompt performance of the work at the busiest time of the year.

(True Extract).

Chief Secretary.

To the Mint Master.
" V. Ramiengar, Superintendent of Stamps.
Exd. J. Tulloch.

Rev: 1867. Dept.
Pro: of Gant for June
W. 1608.

Proceedings in
the Finance
Department.

Dated 18th June
Received 22d 1867.

W. 264.

Declining to sanction any change in the method of assaying at the Madras Mint and deputing the Supt. of Stamps to inquire and report upon the office work of the Assay Dept.

No 1436. 28 June

With order

A. 401 & 402

W. 1436.

Communicates
to the Board of
Revenue.

28th June 67

1 Copy To the Bd of Revenue with Pro Finl Dept
Dept 25

5