



REPORT ON THE CERAMIC SURVEY
OF THE MADRAS PRESIDENCY

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MADRAS

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REPORT ON THE CERAMIC SURVEY OF THE MADRAS
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GENERAL DESCRIPTION.

The Presidency of Madras comprises the major portion of the Peninsula of India and covers an area of 142,300 square miles. It is bounded on the east by the Bay of Bengal, on the south by the Indian Ocean, on the west by the Arabian Sea and Mysore, and on the north by the Bombay Presidency, the Nizam's Dominions, the Central Provinces and Orissa.

The Presidency is divided into 25 districts. The East Coast is generally known as the Coromandel Coast and the West as the Malabar Coast.

Mountains.

The important mountains in the Presidency are the Eastern and the Western ghats forming a high ridge on the east and west of the Peninsula and consisting of primary stratified rocks, granite and other highly felspathic rocks.

Rivers.

The important rivers in the Presidency are the Godavari, the Kistna, the Pennar and the Cauvery. All these rivers carry a large amount of fine clay from the interior to the East Coast and the clay thus deposited on the banks of the rivers is suitable for the manufacture of various kinds of ceramic goods, such as roofing and flooring tiles, terracotta ware, pipes, etc.

Lakes and tanks.

There are lakes and tanks of varying dimensions scattered throughout the Presidency. The fine silt forming the beds of these lakes and tanks, especially those fed by the rivers, could be excavated every year during the dry weather and used for the manufacture of various kinds of clay goods such as terracotta ware, roofing and flooring tiles, etc.

Waterways.

On the West Coast, there are very good waterways formed by small rivers and back-waters. The tile factories of the West Coast are thus able to get their raw materials, such as clays, firewood, etc., in boats to the factory site.

The only important waterway on the East Coast is the Buckingham canal which runs along a good portion of the East Coast passing through the districts of Chingleput, Nellore, Guntur

and Kistna. From Bezwada, the canal is connected to the Kistna canal, which joins the river Godavari. At the present time, the canal is chiefly used for transporting rice and firewood.

The future clay works on the East Coast should be located on or near the canal so as to get the maximum benefit in transporting the raw materials such as clay and firewood and also to distribute the manufactured goods along the East Coast and to the different ports for the purpose of shipping the clay goods by means of coasting steamers to consuming centres such as Burma, the Malay States and Ceylon.

Roads.

There are well-maintained roads throughout the length and breadth of this Presidency. All the important towns are well linked up with good roads.

Railways.

The Madras and Southern Mahratta Railway Company and the South Indian Railway Company are the two chief railway companies in the Presidency. Almost all the district headquarters and important towns are well connected and linked up with one or the other of the Indian Railways.

The circumstances which led to the sanction of this survey.—The possibilities of the ceramic industry attracted the attention of a number of Directors of Industries of the Government of Madras. In the year 1927, the Director of Industries proposed a survey of the tile industry of the West Coast and requested the tile manufacturers to meet a portion of the expenditure, but the proposal did not appeal to them. They in turn requested the Director of Industries to have the survey conducted at the cost of the Government. In due course, Sir Frederick Nicholson's views on the ceramic industry were invited. The following is an extract from his note on Ceramic Research and Experiment, dated 9th July 1927, to the Secretary to Government in the Development Department:—

“ Should Government undertake work in this admittedly difficult and complex industry involving lengthy preliminary work and considerable outlay?

“ *Provided* that the need is important and even imperative and that private enterprise will not undertake the work, then it is just one of the cases where Government initiative is not only legitimate but requisite.

“ . . . no firm will dream of undertaking an enterprise however important to the country . . .

“ This being so, the Government is the only possible investigator especially on the wider general industry provided the Government is satisfied that the industry is needed, a matter which to me seems hardly doubtful. I doubt the need for anything like fifteen years' solid research for the preliminary experimental work, if the investigator knows his job and is

allowed to work continuously at it and without fear of being 'axed'; personally, I got promising results in a few months working merely in my evenings, when Sub-Collector, and as a mere amateur.

" . . . In the present case, if money is not to be clean thrown away, the investigation must be given beforehand the promise of a definite and reasonable duration; and enquiry cut off halfway, would be useless since the data and experiments would be imperfect and therefore misleading."

In the year 1930, the Government sanctioned a scheme put forward by the Director of Industries for the conduct of a survey of the ceramic possibilities of this Presidency for a period of one year and approved the proposals of the Director of Industries for undertaking a survey of the ceramic industry in the Presidency as a preliminary to the establishment of an experimental ceramic factory.

The survey was to include *inter alia* investigations into—

- (a) the location and character of the raw materials available for use in the ceramic industry;
- (b) the extent of their deposits;
- (c) their commercial value;
- (d) the facilities available for quarrying and transporting them; and
- (e) the present position and potentialities of the tile industry on the West Coast and problems, if any, with which the tile manufacturers are confronted.

In the same year, I was appointed to carry out this work and I joined duty on the 9th of July 1930.

During the remaining months of the year 1930-31, it was possible to carry out the preliminary survey of only eight districts and the period of the survey was extended by another year, i.e., from 1st May 1931 to 30th April 1932. This year it was possible to survey twelve more districts and in addition to the actual survey work, to examine the raw materials for their commercial value at the Ceramic Experimental Station, Madras.

The survey being incomplete, another extension was sanctioned from 1st May 1932 to 31st March 1933. The major portion of this period was devoted to the examination and testing of the raw materials collected from the districts surveyed and in addition it was possible to survey three more districts. Thus 23 districts were surveyed on the whole.

INTRODUCTION.

The ultimate aim of the survey was to carry out a preliminary inquiry with a view to establishing a Government Experimental Ceramic Factory and to solving the problems met with by the West Coast tile manufacturers.

Before undertaking the actual survey, I examined all the China clay and rock collections in the Geological section of the Madras Museum. There are a few samples of very good China clay and felspar suitable for the manufacture of porcelain, but to my great disappointment, it was not possible to get the names of the exact places of occurrence of these minerals.

The Government School of Arts and Crafts, Madras, once had a pottery section and produced very nice vases and glazed pottery out of the raw materials found in this Presidency. Even here, I was not able to get any information about the exact place of occurrence of the raw materials used by them.

The only information I could get, to commence the investigation, was from the Geological Survey Records, the old records of borings put down by the Department of Industries, and from the Revenue department officials.

Raw materials.

The following are the chief raw materials used in the manufacture of ceramic wares:—

- (1) Kaolin or china clay.
- (2) Ball clay, pipe clay and other light burning clays.
- (3) Stones—Felspar, cornish stone.
- (4) Flint.

This Presidency is rich in all the abovenamed raw materials.

“The Cretaceous rocks and plant-beds of Trichinopoly yield several fine clays well adapted for the manufacture of pottery and other materials used in the ceramic arts, viz., china stone and kaolin, felspar, flints and gypsum are all obtainable within the area described in the foregoing report. None of these are utilized by the natives.” (Mem: Geol. Survey of India, Volume IV, page 211.)

1. *Kaolin or China clay.*—“In the year 1841, Dr. Christie (Journal of the Asiatic Society of Bengal, Volume X, page 967), discovered in association with the laterite a few miles to the north of Mangalore an extensive deposit of what he conceived to be a pure porcelain clay resembling that of Limoges in France, and from which Sevres china is made.”

2. *Pipe clay or plastic buff burning clays.*—“The beds of the Rajmahal series afford inexhaustible supplies of very fine pottery clays more especially at Sriperamadur, and in the Attrampakkam nala.” (Foote—Mem: Geo. Survey of India, Volume X, page 132.)

“From the beds exposed at Coopum near Perumalput, a supply has been taken for use of the School of Arts, Madras, where some very good pottery was turned out under Dr. Hunter's direction. The natives make no use of these clays.”

3, *Felspar and other kinds of stones*.—(Mem: Geol. Survey of India, Volume IV, Part 2, page 51, Holland). “If there was any market for porcelain industry, an abundance of clear felspar now rejected, would be available in any part of the mica belt.”

“Cornish stone, from which a somewhat ferruginous kaolin may be obtained by washing, occurs at Semangalam in the north-east corner of Villupuram taluk.” (District Gazette, South Arcot, page 22, Volume I.)

4. “Flints, almost undistinguishable from English chalk flints, are found at Coorchycolum, a few miles south of Vellur, and to the south-east of Sainthoray. They are believed to exist as a continuous band, not as detached nodules . . .” (H. F. Blandford, Mem: Geo. Survey of India, Volume IV, pages 211-13.)

The search for raw materials.

The earth's crust consists of strata of different types of clay sandy clay, gravel bed, marble, laminated sandy clay, pebbles, stiff clay, white clay, blue clay, black clay, red clay, rock, etc. The report of the boring put down near Vriddhachalam in South Arcot district by the Industrial Engineering section of this department revealed the existence of good white clay at a depth below 50 feet. (The English China clay pits are about 200 feet in depth.) In view of the limited time at my disposal, it was decided to confine the investigation to such deposits as were found on the surface as out-crops, the strata revealed in railway cuttings, hills, mines, river sides, streams, well excavations, etc. Wherever necessary, a few trial pits were also put to a depth of 4 or 5 feet, and marked for boring investigation whenever necessary.

It was possible to identify the following raw materials and I consider them eminently suitable for use in the ceramic industry:—

- (1) China clay, plastic clay, fire clay and a number of other types of clay which would find a wide use in the ceramic industry.
- (2) Rocks rich in felspar, white pegmatite, green pegmatite granite rocks of different varieties.
- (3) Flint and sand.
- (4) Gypsum.

The extent of their deposits.

A large number of borings were put down in selected localities all over the Presidency by the Industrial Engineering section of the Department of Industries, in order to ascertain the extent of the valuable clays found below ground level. The results of

the boring operations carried out in connexion with the ceramic survey are included in Appendix C and some of the boring results selected from the old records of the borings already put down by the Department of Industries before the survey was sanctioned are included in Appendix D.

The commercial value of the raw materials.

To find out the commercial value of all the raw materials collected during the ceramic survey, a number of samples of clays and rocks were submitted to chemical analysis and this work was entrusted to the chemists attached to the Department of Industries, who, in addition to their own work, were able to analyse only a few samples. To analyse the remaining samples that were considered useful, special full-time chemists were engaged. The results of the chemical analysis of clays will be found recorded in Appendix A and of the rocks, sands, etc., in Appendix B. The determination of the physical properties of the raw materials such as their plasticity, fusibility, colour after firing, the percentage of contraction from wet to dry and after firing, the percentage of clay substance and impurities was carried out at the Ceramic Experimental Station at Washermanpet, Madras.

Apart from the above investigations, different types of ceramic bodies were blended with the raw materials collected during the survey and a few articles were glazed and exhibited at the South Indian Athletic Association exhibitions held in Madras in the years 1931-32 and 1932-33. The exhibition authorities awarded gold medals for the ceramic exhibits on both the occasions.

At the above exhibition, the ceramic exhibits attracted the attention of His Excellency the Governor and Lady Stanley and a number of distinguished ladies and gentlemen from all over the Presidency including some of the tile factory owners of the West Coast and all of them were delighted to see the large collection of ceramic raw materials, the variety of clay articles turned out on a country potter's wheel with local raw materials and the demonstration of various other processes involved in the actual manufacture. The ceramic map of the Presidency which was displayed in the exhibition booth drew pointed attention to the vast ceramic resources awaiting development in this Presidency and a number of interested parties noted down the important areas.

China clay, the chief raw material used in ceramic and several other industries, is found in many parts of the Presidency. The fact that during the year 1927-28, Rs. 18,06,546 and during 1929-30, Rs. 15,15,346 worth of china clay was imported into India from foreign countries chiefly for use in the 'Textile Industry' indicates the economic and commercial value of this raw material and when its adaptability for use in the manufacture of ceramic ware of various grades is taken into consideration, the potential economic value of this material should be considerable.

China clay is found practically all over the world. The annual output of china clay in some of the important clay-producing countries of the world is given below :—

Annual production.

	TONS.			
United Kingdom	716,319
* India	19,166
Czechoslovakia	400,000
France	169,000
Germany	377,556
Italy	22,300
United States	455,673
China	300,000
Manchuria	23,000

Over 85 per cent of the china clay production in the world is used in the manufacture of paper, textile goods, colours, distempers, ultramarine, hnoleum, blanco substitutes, rubber goods, tooth powder, tooth paste, soap and soap powders, slate pencil, wall paper, metal polish, as basis of many carbolic and disinfectant powders, and for replacing linseed and bread poultice. It is also used by the medical profession as an absorbent of toxins of the alimentary canal and it has been found to give excellent results in Asiatic cholera. Only 15 per cent of the total output finds a use in the pottery industry.

In this Presidency, a ton of crude china clay could be had for a couple of rupees, but if properly purified by the simple washing process or by Electro-Osmosis process it should sell for Rs. 30 or even Rs. 40 per ton in this country.

Any quantity of felspar which is one of the most valuable ingredients used in the manufacture of porcelain is available in the Madras Presidency. At the present time this raw material is used as road metal in some parts of the Presidency and is thrown away as waste in several of the mica mines of this Presidency.

The imports of earthenware, porcelain and sanitary ware into India are given below :—

	<i>Value in rupees.</i>		
	1927-28.	1928-29.	1929-30.
Total imports	80,70,870	73,09,294	72,33,585
Imports from Japan ..	32,58,771	25,45,184	31,47,195
Imports from other foreign countries	17,81,644	19,37,546	15,18,734
Total foreign imports ..	50,40,415	44,82,730	46,65,929
Imports from the United Kingdom	30,30,455	28,26,564	25,67,656
Total imports	80,70,870	73,09,294	72,33,585

* The quantity mentioned above is mostly from outside this Presidency from Mysore and North India.

Facilities for quarrying and transport.

In this Presidency there are good facilities for both quarrying and transport. There are good roads all over the country linking the big towns and railways. Labour is also very cheap. An average workman gets 4 annas to 8 annas a day and a female labourer and a boy labourer get each from 2 annas to 6 annas a day.

The boring results included in the Appendix will reveal the nature of the strata of the ground below and the strata lying over the clay-bed proposed to be worked and its thickness which will help to determine the methods of excavating the same, i.e., either to quarry in open pits or to mine.

The West Coast tile industry.

In the Government Order sanctioning the ceramic survey of the Presidency, the following is one of the items of investigation included :—

“ An investigation of the present position and potentialities of the tile industry on the West Coast and problems, if any, with which the tile manufacturers are confronted.”

Before dealing with the above points a brief description of the place and the origin of the tile industry on the West Coast will be of interest.

The West Coast lies between the Western Ghats and the Arabian Sea, a vast narrow stretch of land forming the two districts of Malabar and South Kanara and cut away from the rest of the Madras Presidency by the Western Ghats.

In the year 1800, Sir Thomas Munro wrote as follows :—

“ Canara will probably never be a manufacturing country, because the heavy rains which last so great a part of the year are an unsurmountable obstacle to all operations which require to be carried on under a clear sky and open air.”

“ These words remain true to the present day (1894) as regards indigenous efforts, but the Basel Missionaries have recently shown what good use can be made of the clay with which Canara seems to be especially favoured. Factories for the manufacture of bricks and tiles have been started by the Mission and by others at Mangalore, Udipi and Coondapur which meet not only a constant local demand but export largely to Bombay and other places on the coast and also by road inland to Mysore and Ootacamund. They are experimenting with white clay in the hope of eventually being able to manufacture porcelain.” (District Manual of South Canara, printed in the year 1894.)

As stated above, the first tile factory was started by the Basel Missionaries to provide work for the Christians converted by them. The art of manufacturing these tiles was kept a secret for a long time. Eventually with the aid of the workers in the mission tile works other tile factories were opened by the local people.

The South Kanara tile manufacturers had the complete control of the tile trade of the East. Tiles were sent to Burma, the Federated Malay States, Australia and other places in the East. Gradually the number of tile factories increased in South Kanara and in course of time the art of tile manufacture found its way into the Malabar district.

The Malabar Tile Industry.

In Malabar, the tile factories are mostly located along the railway line from the borders of South Kanara district to the eastern boundary of Malabar district.

Tile factories were started in Malabar by stages. Malabar had the advantage of studying carefully the various processes involved in tile manufacture by their neighbours and adopted only the best ways of working, which advantage the pioneers did not have. An average Malabar tile factory is generally better furnished with up-to-date clay working machinery than an average South Kanara factory.

The Malabar tile manufacturers started competing with their neighbours and eventually captured all the important markets of South Kanara in this Presidency and elsewhere and completely blocked the only inland railway route to the other parts of the Madras Presidency. This gave a severe blow to the South Kanara tile trade.

THE JOINT MEETING AT MANGALORE.

The Honorary Secretary of the South Kanara District Advancement Association, Mr. Ranganatha Punja, called for a joint meeting of the members of the Tile Manufacturers Association to discuss with me various problems connected with their tile industry. The joint meeting took place at the Government Trade School, Mangalore. There was a representative gathering of the members of both the associations. Mr. Saldanha, ex-member of the Madras Legislative Council, Mr. M. S. Sreshta and Mr. A. B. Shetty, both members of the Madras Legislative Council, were also present at this meeting. There was a lively discussion. One of the tile manufacturers stated that there was no need for any technical advice on tile manufacture as they had been manufacturing tiles for over half a century. Some tile manufacturers desired that I should inspect their tile works and offer my remarks and suggest some modern methods and in the end, it was resolved that I should do so. At the joint meeting I exhibited a few varieties of glazed and unglazed ceramic wares that could be made out of the West Coast raw materials.

I had the pleasure of inspecting the tile factories of Mangalore—both large and small. The tile manufacturers were kind enough to afford me all facilities for my investigation. I went into every detail, the raw material, the methods of manufacture, the general lay-out, organization, transport facilities, their system of working, technical control, etc. My attention was drawn to the various defects usually met with in tile manufacture—viz., blisters, cracks, white spots, rough surface, etc., on the tiles. Such faults are attributed to bad firing of the kiln and usually the kiln fireman is blamed for it and is held responsible although the fault is not entirely his own. It is not possible to completely overcome such faults and turn out one uniform good quality but it is possible to minimise such faults. In an average roofing tile factory in Europe, the breakages amount to only two to three per cent and the rest are of finest quality.

Extract from the eleventh annual report of the District Advancement Association, South Kanara, Mangalore, for the year ending 1931.

“ *Aid to tile industry.*—During the Exhibition, Diwan Bahadur Appadurai Pillai, Director of Industries, was present by invitation, and various members of the Association had an opportunity of pressing important questions before him for consideration. Relief to the tile manufacturers was one of the subjects discussed with him and as a result, Mr. D. S. Pillai, the Ceramic Expert to Government, was sent here by the Director. Mr. Pillai attended a joint meeting of the members of the association and the tile manufacturers, at which he explained the various processes for improving the quality of our tiles, the methods of separating and storing different kinds of clay, about the value of correct heating of kilns and also exhibited various useful articles that could be made out of Indian clay. At the meeting it was resolved to address the Government—

- (a) to open an experimental and demonstration ceramic factory;
- (b) as to the location of the proposed ceramic factory, having regard to the offer of Messrs. A. Albuquerque and Sons, Matpadi Brothers, and C. V. Naick, to place their factories at the disposal of the Ceramic Expert for the purpose;
- (c) to request the Ceramic Expert to report upon the true causes of the prevailing depression in the tile trade; and
- (d) to place the services of the Ceramic Expert at the disposal of the tile manufacturers, to help them on technical matters.

Later on the Ceramic Expert visited factories and he visited different parts of the district and he was also supplied with white clay from Kuloor, Uppinangadi, Mangalore and Moolky all of which he declared fit for porcelain manufacture ”

Space does not permit me to deal at length in this report with all the important points, but I shall offer my general remarks.

The raw material.

In the majority of the tile factories, I have noticed as many as five different types of clay being used. The different kinds of clays are stored in *uneven layers* one above the other until an artificial

clay-bed is formed on the factory site. In some works, I have noticed the above bed to be of a thickness of 30 to 40 feet piled up in the form of a hillock and allowed to stand exposed to atmospheric changes for long periods. Some works store them for years.

“Weathering.”

This process is locally known as “weathering.” If clays are stored as already described only the top layer of clay will undergo the process of “weathering,” and the remaining layers will not. I do not see any useful purpose in storing different layers like that. On the other hand, if properly mixed clay is stored in cisterns (not more than 6 feet in depth) for “souring” or “sumping” it will no doubt yield a better class of tile body. In European tile factories, these “sumping” or “souring” cisterns have a capacity of about 9,000 cubic yards and the clay is usually stored for 7 weeks only.

Mixing of different clays.

The present method of mixing different kinds of clay is defective in certain respects. Pure clay consists of alumina, silica and water in a combined form. The clays used by the tile manufacturers contain in addition to the above the following ingredients, viz., iron, lime, alkalies and other inorganic and organic impurities. It is not possible to get clays of one uniform composition. Some have a high silica content and some a high alumina content and other ingredients also vary in different varieties of clay. Such being the case, more attention should be paid to the mixing of a tile body especially when more than one type of clay is used. If this work is not properly done, the tile body will not have one uniform composition. In the tile works I had noticed that the layers of different varieties of clay are not spread uniformly—a section cut across the clay heap reveals different strata of uneven thickness. It is not possible to form one uniform clay composition for the tile body by this method. A section of prepared clay cut out of the mouth piece of the pug-mill in one of the factories revealed visible veins of different clays used to form the tile body. Such being the case, it is not possible to obtain a fairly uniform tile body. If more attention is paid to this part of the work, it will be very beneficial to the tile manufacturers.

The ingredients contained in clay, viz., silica, alumina, iron and alkalies play an important part in forming the tile, the silica and alumina form the body, the iron besides giving the desired colour also acts as a flux at high temperature and the alkalies act as flux and give that metallic ring and strength.

The six different classes of tiles and their money values.

The tiles as they are removed from the kiln are sorted out into six different grades, classified as first, second, third, fourth, fifth and sixth quality. The first grade is sold at the rate of about Rs. 45 per 1,000 tiles, and the second grade is sold for Rs. 5 less

and so on Rs. 5 less for the class lower than the preceding one. I drew the attention of one of the manufacturers to this point. The reply was "we don't pay the 'tile maistri' anything for the lower classes." The amount of clay wasted in turning out the millions of lower grades, the fuel for baking such tiles and the space occupied by them in the factory, viz., the racks and trays—all such details escape the attention of the tile manufacturer who indirectly loses a large amount of money in this direction.

It is desirable that every article that is produced in a factory should have an exchangeable value, and more attention should be paid to the raw materials from which the article is made. Clay is one of the most complicated raw materials to deal with, because in nature it is very difficult to get two clays alike in their chemical composition and the physical properties.

Competition.

The future of the South Kanara Tile Industry is not very bright. There is the Malabar tile industry on one side blocking the only inland rail route to other parts of this Presidency and competing with the South Kanara tile industry severely. Attempts are being made to manufacture similar tiles in certain centres which used to import these tiles. One of the Malabar tile manufacturers has started tile manufacture at a place very near Bangalore and is producing similar tiles and a local brick manufacturer has also started tile manufacture in Madras.

There was a time, when every one believed that the West Coast alone is possessed of suitable clays for the manufacture of tiles. During the ceramic survey of this Presidency, I had the opportunity of locating suitable clays for the manufacture of roofing tiles of similar pattern in many parts of the East Coast of this Presidency. As a result of the experiments carried out at the Government Ceramic Experimental Station, Madras, similar tile factories are now being erected on the East Coast.

In Mangalore alone, there are over 30 tile factories turning out millions of tiles daily and competing with each other.

South Kanara has a complete control over the tile markets of the Bombay Presidency, where the bulk of their tiles are sent. In Bombay, owing to competition among themselves, these tiles are being sold at less than their cost price in South Kanara, the place of manufacture.

The future possibilities.

There are vast raw material resources on the West Coast of this Presidency awaiting ceramic development. Successful attempts were also made by the Basel Missionaries to produce porcelain out of the raw materials found in South Kanara. Any quantity of white clay and felspathic rock is available on the West Coast. The preliminary tests and glazed articles turned out of the raw materials of the West Coast at the Ceramic Experimental Station, Madras, are very promising.

The Ceramic Experimental Station.

Almost all the raw materials collected during the survey were examined for their commercial value by submitting them to various tests. In addition a number of articles were made on the country potter's wheel and some were glazed in the test kiln attached to this station.

The following investigations were also carried out:—

- (1) Over a dozen different samples of clays sent by the Jeypore Samasthanam were examined and a few glazed articles made out of them were sent to the Raja Saheb. As a result of the above investigation a tile factory is now under construction in Jeypore, Vizagapatam district.
- (2) A few samples of clays collected from the Pedapavani estate near Kavali in Nellore district were also examined and glazed articles made out of this clay were sent to the Zamindar. He visited the experimental station and is now contemplating the opening of a ceramic works in his estate.
- (3) Mr. N. G. Reddi, B.A. (Cantab.), son of the Raja Saheb of Munagala, carried out experiments under my directions at the above station with the clays found at Ambattur in Chingleput district with a view to manufacturing Mangalore pattern roofing tiles. The experiments were very successful.
- (4) The East India China Clay Company of Nellikuppam, South Arcot, had a few thousands of fire-bricks fired in the test kiln attached to the experimental station.
- (5) Experiments were carried out for M.R.Ry. Rao Sahib A. K. Ranganatham Avargal, Engineering contractor and proprietor of brick fields near Madras with the clays collected from his brick fields. The results were successful and Mangalore pattern tiles are now being manufactured in his brick fields near Madras.
- (6) The clay brought by Mr. Muller, Mining Engineer, was examined and a few articles were made out of this clay and samples of the same were given to him.

Technical assistance rendered.

(a) A fire brick kiln was built for the East India China Clay Company at Nellikuppam, South Arcot district.

(b) A suitable clay deposit near Madras was selected for the Jamal Glass Works, Madras, for use in place of imported fire clay and the selected clay has been used for all their furnace construction work.

(c) The Patel Biscuit Company, Madras, had to suspend work on account of a leakage in their biscuit oven and a special cement mixture was supplied to stop the leakage.

(d) Messrs. Parry and Company, Madras, were supplied with information about the exact location of certain clay deposits. The general manager of their Ranipet Pottery Works visited the experimental station and took samples of various clays from the experimental station.

(e) The proprietor of the Standard Tile Company, Malabar, visited the experimental station and took samples of stoneware clays found near Madras. He also visited the stoneware clay deposits near Madras.

(f) Dr. Correlli was furnished with information about clays and limestone suitable for the manufacture of Portland Cement.

(g) The Andhra Pottery Company, Nellore, sent a sample of white clay which was examined and found to be eminently suitable for the manufacture of high grade porcelain.

A special short course in elementary ceramics was given at the request of Miss M. F. Prager, the Inspectress of Girls' Schools, for about a dozen lady teachers, at the Experimental Station, Madras. The course included both practical pottery, viz., modelling, mould-making, casting, shaping of clay wares on the potter's wheel (throwing) and lectures in Ceramic Technology, including lantern lectures describing how porcelain is made in England. The Inspectress and the teachers who had their training have determined to push through this work in schools. They were also supplied with eight potter's wheels for use in their respective schools. Sister Y. Patrick of Church Park Training College, who paid several visits to the ceramic experimental station, has proceeded to England for receiving practical training in pottery.

Public opinion on the work done at the Experimental Station was favourable.

Experiments under factory conditions.

It was also possible to carry out a few experiments under modern factory conditions at Messrs. Parry and Company's Ranipet Pottery Works, which further confirmed the high ceramic value of the raw materials collected.

Science in pottery.

Dr. Plott describes the 17th Century English potters as follows:—

“ Wild, moorlandish people.”

It was during the year 1650, that the English potters were able to make crude unglazed pots known as “ butter pots.” Within half a century, they were able to turn out beautiful glazed articles and to-day they have with them one of the world's greatest chemist (Dr. J. W. Mellor, F.R.S.) as their scientific head.

India produced pottery, decades of centuries before the Christian era. There is mention of pottery in the vedic hymns, but our potters even to-day are as wild as ever. Chemical science

plays a very important part in the ceramic industry. I do not for a moment suggest that the country potters should be taught chemistry but I consider it possible to give them sufficient training in modern methods of shaping clay wares and other work connected with the production side of the ceramic industry leaving the rest to the Ceramic Expert.

Summary.

This Presidency is rich in raw materials that are largely used in the manufacture of porcelain and other glazed pottery. Clays similar to kaolin or china clay could be had in abundance in Vizagapatam, Guntur, Nellore, Chingleput, South Arcot, Tanjore, South Kanara, Malabar, Cuddapah, Bellary, Anantapur and Kurnool districts.

Felspar and rocks rich in felspar occur in Kurnool, Bellary, Nellore, Chingleput, South Arcot, Salem, Trichinopoly, Madura, South Kanara and Coimbatore districts.

Clays which could be classified as pipe clays occur in East and West Godavari, Kistna, Chingleput, South Arcot and North Arcot.

Plaster of Paris.—Gypsum occurs in Trichinopoly and Chingleput districts. The moulds prepared for use at the Ceramic Experimental Station were all made out of "Plaster of Paris," prepared from crude gypsum available locally.

The experimental results with these raw materials have revealed very promising results.

Acknowledgments.

I wish to express my gratitude to the Directors of Messrs. Parry and Company, Madras, for kindly allowing me to carry out my experiments under modern factory conditions at their Ranipet Pottery Works, which enabled me to repeat some of my experiments and to confirm the real ceramic value of the raw materials of this Presidency; to all those tile manufacturers of the West Coast, who, by open discussion, helped me to gather first hand information; to the Industrial Engineer who kindly carried out all the boring operations connected with this survey; to the departmental and the temporary chemists for carrying out the chemical analysis; and to my laboratory assistants at the Ceramic Experimental Station who have all helped me to present this final report.

ANANTAPUR DISTRICT.

General description.—This district is one of the four Ceded districts of this Presidency. It is bounded on the north by the Kurnool district, on the south by the Mysore territory and the Chittoor district, on the east by the Cuddapah district and on the west by the Bellary district and the Mysore territory.

This district is rich in white clay, rocks rich in felspar, "tsoudu" or soda earth, flint stone, etc., all suitable for the manufacture of glass and ceramic goods.

In this district the bangle industry is struggling hard for existence in the face of foreign competition. This is the only district where block glass for bangles is locally prepared by the bangle-makers with the raw materials available in the vicinity. The bangle-makers in other districts buy block glass from North India.

China clay is reported to occur in S. No. 995-A, Dadithota village, in Tadpatri taluk and in S. Nos. 299-1 and 300-1-B of Julakalva in Anantapur taluk.

For boring results, see Appendix D.

GOOTY TALUK.

Uravakonda.

Location and character.—Uravakonda is about 18 miles from Gulapalem, the nearest railway station, on the Hyderabad-Bangalore line of the Madras and Southern Mahratta Railway metre gauge and about 34 miles north-west of Anantapur. There is a deposit of white clay about one mile away from the Uravakonda taluk office. The clay is of milk white colour and is mixed up with quartz.

Commercial value.—Not determined.

Extent of the deposit.—Not determined.

Facilities for quarrying and transport.—This raw material occurs below ground level. It would be possible to adopt a suitable method of quarrying after ascertaining the thickness of this bed of clay and the nature of the soil covering it from the boring results. This clay is found mixed up with a very large proportion of quartz rock; therefore the clay will have to be removed by the washing process on the spot.

KALYANDRUG TALUK.

Location and character.—The above taluk lies towards the west of the Anantapur taluk. There is a deposit of white clay in the village of Palvoi, very near the village tank. This village is about 5 miles away from the Kalyandrug taluk office. The nearest railway station is Dharmavaram about 40 miles away from the deposit.

Commercial value.—Not determined.

Extent of the deposit.—Small quantities of dirty white coloured clay are visible in the excavations near the tank.

Facilities for quarrying and transporting.—If a thick bed of the clay is revealed, the quarrying should be done with great care because of the village tank close by. The roads are in a very good condition but the nearest railway station is Dharmavaram about 40 miles away.

Rocks and allied stones.—In this district any quantity of rocks and stones suitable for the manufacture of ceramic goods could be had in some of the taluks.

Location and character.—At Palvoi, a peculiar kind of rock resembling flesh-coloured felspar occurs near the village tank along with the clay already described. This village is about 5 miles away from Kalyandrug taluk office and about 40 miles from Dharmavaram—the nearest railway station on the Hyderabad-Bangalore (metre gauge) line of Madras and Southern Mahratta Railway.

Commercial value.—The chemical analysis of this raw material is included in the Appendix B, O 1B under the head of chemical analysis. This material is not felspar.

Extent of the deposit.—This variety of rock is visible as outcrops near about the lake. The extent has not yet been determined.

Quarrying and transport facilities.—If this raw material gives satisfactory results, the quarrying and transport problem could be economically solved. The roads are in very good condition.

PENURONDA TALUK.

Location and character.—A large quantity of flint and other stones rich in silica is available at Guttururu near Makkajjipalli railway station.

Commercial value.—This could be used in the manufacture of certain types of ceramic wares. At present this raw material finds a wide use in the manufacture of bangles locally.

Extent of the deposit.—A large quantity could be collected in the above village.

Quarrying and transport facilities.—The railway station is close by and labour is cheap.

GOOTY TALUK.

Location and character.—Rocks in the hillock in Gooty are felspathic.

Commercial value.—Not determined.

Extent of the deposit.—A large quantity could be collected.

Quarrying and transport facilities.—The railway station is about 3 miles away from the hillock. Labour is cheap.

The Bangle Industry.

The manufacture of bangles in the primitive way is still continued in the village of Makkajjipalli in Penukonda taluk. The bangle-makers themselves produce their block glass for the manufacture of bangles in this village. The majority of the bangle-makers of this Presidency buy their block glass from North India.

One Karuppa Mallappa of Makkajjipalli prepares his block glass from the raw materials available in his village.

The raw materials.—The chief raw materials are alkali extracted from alkaline earth deposits known as Sajjimatti or "Tsoudu Mannu" in a very crude manner, flint and quartz. The alkaline earth contains as much as 10 to 12 per cent of sodium carbonate. Alkaline earth deposits occur practically all over this Presidency.

The crude soda extracted by the villagers contain a large amount of impurities. If they pay more attention to removing these impurities, it should be possible for them to produce more transparent bangles and of different colours in addition to the black-coloured bangles that are being turned out in millions in this village.

The smelting process.—The method of smelting glass by the local bangle makers is very interesting. They make up their batch material consisting of crude soda and flintstone of a certain proportion and fill up a number of crucibles made out of ordinary clay measuring about 2 feet in length and about 9 to 10 inches in diameter closed at one end. These crucibles are then arranged inside the smelting furnace, which is in the shape of a bee-hive having an internal height of about 10 feet and internal diameter of about 5 feet with a single fire place at the bottom and an opening at the top. These crucibles are arranged in such a way as to form an opening in the centre from the bottom to the top to allow the flames to escape through. The fuel used by them is firewood. Once the fire is started, it is continued for about 8 days and 8 nights and afterwards the furnace is allowed to cool. When just warm enough to handle, the furnace is opened and the crucibles are emptied one after another and the molten glass which solidifies on cooling is then obtained by breaking the clay crucibles. This is known as block glass, which the bangle-makers of other parts of this Presidency buy from North India for the manufacture of bangles in their villages. The cost of 10 seers of the North Indian block glass is about one rupee, and a little more for coloured ones. The cost of block glass made by Karuppa Mallappa of Makkajjipalli works out to Rs. 1-4-0 to Rs. 1-6-0 per maund.

How bangles are made.—The block glass is then broken into small bits and placed in small trays made out of clay about eight in number, all enclosed inside a resmelting furnace. This furnace is also in the shape of a bee-hive but very much smaller in size, with small openings all round. i.e., wherever there is the tray for the bangle-maker to work up the molten glass in the form of



bangles. The tools used by the workers are a cone attached to a rod and another spare rod. A bangle-maker with the assistance of a boy is able to turn out 200 dozens of bangles in one day for which he is paid 5 annas and the boy assistant 1 anna as wages. One maund of block glass will supply material for 3,000 bangles. These bangles are of dark colour and are sold at the rate of 20 bangles for one anna. They find a ready sale in the villages. The bangle-makers are very anxious to learn the manufacture of various coloured bangles, which is possible. They must be taught how to purify their crude soda and to adopt some simple modern methods which will enable them to produce clear glass, and once this is obtained, any colour or tint could be produced.

A large amount of block glass adheres to the clay crucibles and is thrown away as waste. By properly insulating the furnace it should be possible to reduce the period of firing and the cost of fuel.

NORTH ARCOT DISTRICT.

This district is bounded on the north by Chittoor, on the south by South Arcot and Salem, on the west by Salem and on the east by South Arcot and Chingleput districts.

It is rich in ceramic raw materials, such as, white clay, pebbles, sands and rocks.

The glazed pottery of Karigeri.

Glazed pottery is manufactured at a village known as Karigeri in Gudiyattam taluk, about 4 miles away from the Katpadi railway station. The articles manufactured by a few potters of this village are decidedly better than those made at Panruti in South Arcot district.

These potters are very clever and are able to shape any article of either Eastern or Western style on their peculiar hand-driven potter's wheel, with their limited tools shaped out of the bamboo. The raw material used in the manufacture of the body is white clay obtainable in Cheyyar taluk in large quantities; but the Karigeri potter buys the 'Namakattis' (the white sticks in the form of pyramids used by the Vaishnavites for their caste-marks) at Vellore and soaks them in water and prepares various shapes out of it. These 'Namakattis' are nothing but washed china clay or white clay found in Cheyyar. The cost of 100 of these 'Namakattis' is about 4 annas and the potter produces 3 'kujjas' which when baked will fetch 8 annas each, and three times the value of the glazed wares.

Method of manufacture.—First of all a proper clay mixture is prepared and the desired shape is then formed on the potter's wheel and kept for drying. These roughly-formed articles are

then turned to a neat form and then dried in the sun. When properly dried the clay goods are baked in a temporary oven built up with broken pots, using cow-dung cakes and firewood. After this process is over, a glaze is prepared out of alkaline earth locally known as tsoudumannu (a mixture of crude soda and silica) mixed up with a right proportion of flint stone and red lead which when fused gives a transparent glass suitable for the manufacture of bangles. This prepared glass is finely ground into a fine paste and diluted with a required quantity of water and then applied on the clay articles once baked and refined, during which process the glass melts and gives glossy coating to the baked clayware. The only colour they have been able to produce till now is green and they are anxious to learn the process of producing various colours other than their usual green. As it is, the articles produced by them find a ready market and are also much admired by Europeans in India and abroad. The Karigeri pottery was exhibited at the Wembley Exhibition held in London and at various other continental exhibitions.

The potters are very poor and are not capable of producing a large quantity of their glazed pottery for which there is a ready sale. They are slowly giving up this art and gradually drifting back to the manufacture of unglazed clay goods such as chattis, etc., to meet local demands. If they are not given proper encouragement, they will soon give up the art of glazing they have practised for over 50 years.

KAVERIPET.

A peculiar kind of sand.

Location and character.—This village is in Tiruppattur taluk and lies between Jalarpet and Kethandipet railway stations. The locality is about 2 miles away from both the railway stations and the actual bed lies within a few yards from the railway line between the two stations.

Commercial value.—This is a kind of sand which will find a use in the manufacture of glazes. Its real commercial value has got to be determined by actual experiment. The chemical analysis of this is included in Appendix B, O 2B.

Extent of the deposit.—A large quantity of this material could be had.

Quarrying and transport facilities.—This material could be quarried by means of open pits. Labour is cheap and the nearest railway station is Jalarpet. It could be conveniently transported by means of bullock carts to the railway station.

Kaolin or white clay beds in North Arcot district.—White clay occurs in several localities in the following taluks of this district: Tiruppattur, Tiruvannamalai, Cheyyar and Arkonam. The most important area is in the Cheyyar and Arkonam taluks (see Appendix D for borings).



CHEYYAR TALUK.

Papantangal.

Location and character.—White clay resembling kaolin occurs at a place known as Papantangal which is about 8 miles north of Tiruvattur on the Wandiwash-Arcot main road. The clay occurs below varying depths under ground level.

Commercial value.—The clay is of a good quality suitable for the manufacture of telegraph insulators, jars, high-grade flooring tiles, glazed wall tiles and other grades of ceramic wares. The chemical analysis of two samples of the above is included in Appendix A, O 1 and O 2.

Original colour—Light buff to white.

Colour after baking—Not yet determined.

Clay substance—Not yet determined.

Impurities—Not yet determined.

Extent of the deposit.—From the excavations already made in the above area, it can safely be predicted that a large supply of this material can be had in the surrounding area.

Quarrying and transport facilities.—As the bed of pure white clay occurs much below ground level, mining system should be introduced in this case for economy.

The nearest railway station Conjeeveram (on the Arkonam-Chingleput line) is about 20 miles away from the deposit. There are good roads leading to Ranipet and several other important places.

Dusi.

Location and character.—This place is in Cheyyar taluk and is about 4 miles from Conjeeveram in Chingleput district. Clay occurs about 10 feet below ground level. The colour ranges from yellow to pale slate colour.

Commercial value.—A very poor quality, but would find a use in the manufacture of the lower grades of ceramic wares.

Extent of the deposit.—The extent of the deposit could only be determined by putting down borings.

Quarrying and transport facilities.—This question could be gone into after knowing the ceramic value of the raw material and the extent of the deposit.

Thiruppanankadu.

Location and character.—This village is about 6 miles from Dusi village. White clay is reported to occur 53 feet below ground level and in S. No. 210, the bed of white clay is reported to be about 17 feet in thickness.

Commercial value.—The clay could not be examined to find its real commercial value, because the variety of clay suitable for use in the ceramic industry occurs 53 feet below ground level and the above borings were put down in the year 1927.

Extent of the deposit.—A bed of 17 feet in thickness of white clay ought to supply clay for a long time—vide borings put down for a private party by the department on 19th June 1927, Appendix D.

Quarrying and transport facilities.—If the clay proves useful, the bed of 17 feet of white clay could be economically mined and the clay transported. The nearest railway station is Conjeeveram about 6 miles away.

ARKONAM.

Pallur village.

Location and character.—A bed of white clay is reported to occur in the village of the above name in the field bearing S. No. 118. This bed is reported to be 21 feet below ground level.

Commercial value.—A sample of this clay could not be got because the borings were put down in the year 1928.

Extent of the deposit.—The bed of 9 feet of white clay could be economically worked if the clay is found to be suitable—vide borings put down for a private party by the department on 15th May 1928—Appendix D.

Quarrying and transport facilities.—This point could be ascertained after knowing the nature of the white clay available in this locality.

SOUTH ARCOT DISTRICT.

This district is bounded on the north by the Chingleput district and on the south by the Tanjore district, on the east by the Bay of Bengal and on the west by the Salem and North Arcot districts.

South Arcot is one of the richest districts in the Presidency so far as ceramic raw materials are concerned. Any quantity of clay, rocks and other raw materials suitable for the manufacture of various grades of ceramic goods is available in several localities. The chief localities are Pannikuppam in Panruti, Thiruvendipuram, Thirumanakuli and Capper Quarry in Cuddalore taluk, Aziznagar Settlement, Peruvapur, Thevangudi in Vriddhachalam taluk, Putterai in Villupuram taluk and near Brahmadesam in Tindivanam taluk (see Appendix C and D for borings).

Panruti.

Location and character.—There are very valuable deposits of white clay suitable for use in the ceramic industries at several localities on the south of the Gadilam river. The chief locality

is Pannikuppam about 3 miles from Panruti railway station. This white substance occurs below a thick overburden of red coloured clay mixed up with pebbles to about 10 to 15 feet in thickness. Below this lies a valuable bed of white clay. The survey number is 56 and about 3 acres and 60 cents have already been leased out to the East India China Clay Company. This white substance is also available in the localities bearing the following survey numbers :—

	ACS.	CENTS.
S. No. 211/8	16	98
S. No. 212/3	1	23
S. No. 212/9	11	35

Commercial value.—This substance seems to be very suitable for the manufacture of the higher grades of ceramic goods such as glazed wall and flooring tiles, pickle jars, cells, electrical insulators, etc. At the present time, this material is being largely used in the manufacture of fire bricks by the East India China Clay Company at Nellikuppam.

For the chemical analysis, see Appendix A.

Original colour—White.

Colour after baking—Buff.

Clay substance—94.34 per cent.

Impurities—5.66 per cent.

Extent of the deposit.—By observing the nature of the deposit and the excavations near by, we can safely predict the existence of a very large quantity enough to supply a number of factories for years together.

Quarrying and transport facilities.—The nearest railway station is Panruti about 3 miles away and labour is cheap.

Tiruvendipuram.

Location and character.—There is a deposit of fine bluish white clay occurring below a thick overburden of decomposed pink coloured rock. The locality is about $2\frac{1}{2}$ to 3 miles from Nellikuppam railway station and about the same distance from Cuddalore railway station.

Commercial value.—This very material is being used by the East India China Clay Company at Nellikuppam for the manufacture of their fire-bricks and boiler-seatings. This clay could be used in the manufacture of stoneware pipes and other sanitary wares. The chemical analysis is included in Appendix A, No. 04.

Original colour—Light blue to ash.

Colour after baking—Buff (dark).

Clay substance—70 per cent.

Impurities—30 per cent.

Extent of the deposit.—From the excavations already made we can safely predict the existence of a very thick bed of this fine clay.

Quarrying and transport facilities.—There is a good road leading to Cuddalore and the railway station is about 3 miles away. This deposit could be economically worked.

Tirumanakulli.

Location and character.—There is a bed of bluish white clay similar to that of Tiruvendipuram. In fact, the bed runs from Tirumanakulli towards Tiruvendipuram and Cuddalore side. This bed of clay occurs below a very thick overburden of red coloured rock.

Commercial value.—This clay is as good as the Tiruvendipuram white clay and will find a wide use in the ceramic industry.

Extent of the deposit.—A large quantity could be had. For boring result, see Appendix C.

Quarrying and transport facilities.—The nearest railway station is Nellikuppam which is 3 miles away. The road is not very good and a wide and sandy river-bed has to be crossed before reaching Nellikuppam.

Capper Quarry hills.

Location and character.—A thick bed of white clay below 20 feet in the Capper Quarry hills has been revealed during the boring operations. The nearest railway station is Cuddalore New Town which is 4 miles away.

Commercial value.—This clay substance is suitable for the manufacture of certain types of ceramic wares. The chemical analysis of the white clay substance is included under Appendix A-05.

Original colour—Light purple.

Colour after baking—Buff.

Clay substance—Not determined.

Impurities—Not determined.

Extent of the deposit.—A large quantity is available. For further particulars, see Appendix D.

Quarrying and transport facilities.—The required type of clay could profitably be mined. The road is in good condition and the railway station is about 4 miles away.

VRIDDHACHALAM TALUK.

Aziznagar Settlement.

Location and character.—White clay occurs at several places in this taluk. There is a bed of white clay between 1st to 18th feet and 152nd feet at Thiruvengudi which place is about 9 miles from Vriddhachalam railway station and another bed of white clay between the 40th and 65th feet below ground level at Peruvrapur (see Appendix D) which is about 14 miles from Vriddhachalam

railway station. It will not be profitable to work the abovementioned beds. The white clay found here is suitable for the manufacture of certain types of ceramic goods.

Commercial value.—The best quality occurs between the 42nd feet to the 118th feet which, when properly treated, would have a high commercial value.

The chemical analysis of two different samples of the clay substance is included in Appendix A, Nos. 06 and 07.

Original colour—Light blue to ash.

Colour after baking—Light buff.

Clay substance—Not determined.

Impurities—Not determined.

Extent of the deposit.—The borings put down by the department at the Aziznagar settlement reveals a large quantity of white clay. For further details, see Appendix D.

Quarrying and transport facilities.—The best method would be to mine the required clay just as coal is mined or to extract it by the open pit system. The nearest railway station is Uthangalmangalam which is about 2 miles away.

VILLUPURAM TALUK.

Location and character.—Putturai village is about $3\frac{1}{2}$ miles from Villianur railway station and about 5 miles from Pondicherry.

There is an excellent bed of bluish white clay occurring below 8 to 10 feet of overburden consisting chiefly of laterite and pebbles in the late Mon. Jules Guerre's estate. Boring was put down for Mon. Jules Guerre at Coastari, in Putturai village in Villupuram taluk on 18th April 1929.

1 to 30 feet white clay.

30 to 60 feet yellow clay.

Commercial value.—This is an excellent clay and has been tested and found suitable for the manufacture of stoneware and other ceramic goods and also for the manufacture of heat proof Mangalore pattern roofing tiles at the late Mon. Guerre's Ceramic Works at Putturai.

Extent of the deposit.—This bed of clay is found in a wide area and a large quantity could be had. For boring results, see Appendix D.

Quarrying and transport facilities.—The nearest railway station is Villianur which is about $3\frac{1}{2}$ miles to 4 miles from the clay spot. Labour is cheap and the clay could be economically carted to the railway station.

TINDIVANAM TALUK.

White clay suitable for use in the ceramic industry exists in several localities in this taluk.

Kumalapattu.

Location and character.—The Kumalapattu reserve forest is about 4 miles towards the south of Brahmadesam which is on the main road to Tindivanam and Markanam. The white substance occurs as an out-crop in certain localities and in some places below a depth of about 4 to 6 feet of the ordinary soil.

Commercial value.—The substance is milk white and will find a wide use in the ceramic industry. The ceramic value could only be determined by submitting the raw material to certain ceramic tests. The chemical analysis of this raw material is included in Appendix A-08.

Original colour—White.

Colour after baking—White.

Clay substance—Not determined.

Impurities—Not determined.

Extent of the deposit.—Occurs in a wide area.

Quarrying and transport facilities.—The quarrying and transport problem could be economically solved. The main road is only $3\frac{1}{2}$ to 4 miles away. Tindivanam railway station is about 10 miles from Brahmadesam.

BELLARY DISTRICT.

General description.—This district is the westernmost of the four Ceded districts of this Presidency. Only the eastern part of this district is connected with the rest of the Presidency, the other three sides are bounded by the Nizam's Dominions on the north, the Mysore State on the south and by the Dharwar district of the Bombay Presidency on the west.

This district is rich in white clay, rock with flesh coloured felspar, stones and ochres, all suitable for the manufacture of ceramic goods. For boring results, see Appendix D.

BELLARY TALUK.

Clays.

Location and character.—There is a large deposit of white coloured clay on the Copper hill near Hathi. This occurs under a thick overburden of red soil and rock at a height of about 200 feet from ground level. This hill is 10 miles away from Bellary. Below the red soil the colour is pink, and gradually changes to white.

It is a highly silicious clay without plasticity.

Commercial value.—Both the pink and white varieties of clay will find a wide use in the ceramic industry.

The chemical composition of the white clay is included in Appendix A, No. 09.

Extent of the deposit.—A very large quantity could be had.

Facilities for quarrying and transporting.—If, after submitting the sample to various practical tests, it is found to be useful, this raw material could be economically quarried and transported. The road leading to the spot is very rocky, but is suitable for country carts. Bellary railway station is nearly 10 miles distant and nearly 8 miles of the tract is rocky and clayey.

HOSPET TALUK.

Location and character.—At Papinayakanhalli a variety of black plastic clay is available. This clay could be used in the manufacture of certain grades of clay wares, roofing and flooring tiles.

Commercial value.—This is a suitable clay for the manufacture of terra cotta wares.

Extent of the deposit.—From local enquiries I understand that a large quantity of this variety of clay is available.

Facilities for quarrying and transporting.—This problem could be economically solved because labour is cheap and the railway station is close by.

HARPANAHALLI TALUK.

Location and character.—A yellowish white clayey substance occurs as a result of decomposition of rocks at a distance of 2 miles from Harpanahalli on the main road to Hospet.

Commercial value.—It is of no commercial value as it contains a high percentage of lime.

The chemical analysis is included in the Appendix A, No. 010.

Original colour—Light yellow.

Colour after baking—Buff.

Clay substance—48 per cent.

Impurities—52 per cent.

Extent of the deposit.—Owing to wet weather it was not possible to put any trial pits in order to determine the thickness of the bed of clay.

Facilities for quarrying and transport.—The nearest railway station is Kotturu about 20 miles from the deposit.

HOSPET TALUK.

Rocks and stones—Papinayakanhalli.

Location and character.—A variety of granite rock suitable for the manufacture of ceramic goods is available in this village which is about one mile from Papinayakanhalli railway station.

Commercial value.—A very useful raw material.

Extent of the deposit.—Any quantity could be quarried.

Facilities for quarrying and transporting.—The rock could be economically quarried. The nearest railway station is about one mile away.

Tornagallu.

Location and character.—The hillock close to this village contains valuable rock containing flesh coloured felspar.

Commercial value.—Not yet tested. From the chemical analysis, vide Appendix B-03B its wide use in the ceramic industry can be predicted.

Extent of the deposit.—A very large quantity is available.

Facilities for quarrying and transporting.—This could be economically quarried. Labour is cheap and the Tornagallu railway station is about a mile from the hillock above mentioned.

KUDLIGI TALUK.

Location and character.—A variety of rock containing felspar occurs in many parts of this taluk particularly near Yakkeconda and Hurlihallu and Valasi, about 12 miles from Gudekota and 30 miles from Kudligi.

As far as Gudekota, the road is good. From Gudekota to Valasi and other places mentioned above, the road is very bad, only fit for country carts.

From Gudekota, the nearest railway station is Rayadrug about 25 miles away.

Commercial value.—Not yet tested. From general appearance its wide use in ceramic industry can be predicted.

Extent of the deposit.—The substance is found scattered all over the place. A large quantity could be collected.

Facilities for quarrying and transporting.—The road is suitable for country carts. The nearest railway station is nearly 37 miles away.

HOSPET TALUK.

Humpi.

Location and character.—A large quantity of rock rich in felspar occurs in a wide area at Humpi.

Commercial value.—Suitable for the manufacture of certain grades of ceramic goods.

Extent of the deposit.—Any quantity is available.

Facilities for quarrying and transporting.—The rock could be economically quarried, the nearest railway station is Hospet about 8 miles away, and the roads are in good condition.

Bailur and Dammura.

Location and character.—A large quantity of rocks resembling flesh coloured felspar occurs at the above two places about 13 miles directly north of Bellary.

Commercial value.—The analysis of this rock is included in Appendix B, No. 04-B which reveals 5 per cent of lead and 4 per cent of copper and no alkalies. This material is not felspar.

Extent of the deposit.—Any quantity can be had.

Facilities for quarrying and transporting.—This could be economically quarried. There is a very good road running from this spot to Bellary.

THE CHINGLEPUT DISTRICT.

General description.—This district is bounded on the north by the Nellore district, on the south by the South Arcot district, on the east by the Bay of Bengal and on the west by the North Arcot and Chittoor districts. Various types of clays suitable for use in the ceramic industry are available in many parts of this district. Other raw materials such as felspathic rocks, sand and gypsum are also found in plenty. For further particulars, see boring results—Appendix D.

SAIDAPET TALUK.

Clays.

Location and character.—There is a valuable deposit of ceramic clay in Ambattur about 10 miles from Madras. There are two types of clays found in the above locality. One is of light blue or slate colour and the other is fairly white. Both these varieties occur below the red laterite or gravel beds of Ambattur at varying depths. This is visible in the cuttings already made by the railway. There is also a valuable bed of black plastic clay suitable for the manufacture of Mangalore pattern roofing and flooring tiles and terra cotta wares, in the Ambattur tank.

Commercial value.—All the three types, namely, the white, blue and the black clays found in Ambattur area are suitable for the manufacture of various grades of ceramic wares. The experimental results are very encouraging.

The chemical analysis of the Ambattur white clay is included in Appendix A, No. 011.

Other observations (white clay)—

Original colour—White.

Colour after baking—White.

Clay substance—58.40 per cent.

Impurities—41.60 per cent.

The chemical composition of the Ambattur blue or slate coloured clay is included in Appendix A, No. 012.

Other observations (blue clay)—

Original colour—Light blue or slate colour.

Colour after baking—Buff colour.

Clay substance—57.4 per cent.

Impurities—42.6 per cent.

Extent of the deposit.—A large quantity of both white and blue clay is available. For further details, vide Appendix C.

The black clay.—In the tank bed in Ambattur a variety of fine black clay could be had. The tank covers a very wide area; therefore a large quantity of this type of clay is available.

Quarrying and transport facilities.—The major part of the quarrying done now consists in the removal of gravel and laterite. Below the laterite the above clays, white and blue, occur. Therefore quarrying these clays should be easy. Ambattur railway station is within a few yards from the above deposits. Ambattur is about 10 miles away from Madras and the Tiruvallur-Madras trunk road passes through Ambattur.

TIRUMULAVAYAL.

White clay.

Location and character.—This village is about $2\frac{1}{2}$ miles from Avadi and Ambattur railway stations. Near this village there is a bed of white clay below 10 or 15 feet from the ground level. It is a highly refractory clay. The percentage of clay substance is very little as is the case with the English china clay deposits. The major portion of it is uncombined silica.

Commercial value.—This clay is suitable for the manufacture of high grade refractory and ceramic goods. The percentage of clay substance is very little; therefore it will have to be separated by washing process which will be expensive.

Other observations—

Original colour—White.

Colour after baking—Light buff.

Clay substance—Not determined.

Impurities—Not determined.

Extent of the deposit.—Not yet determined. A thick bed of this type of clay is visible in the excavations for well in the above village. For boring results, see Appendix C.

Facilities for quarrying and transporting.—The nearest railway stations are Ambattur and Avadi about $2\frac{1}{2}$ miles away—practically the same distance to both the stations. Being a village, cheap labour could be had. A good supply of water is also available on the spot for washing out the white clay substance from quartz and sand.

SRIPERUMBUDUR TALUK.

Location and character.—A variety of ash-coloured clay of a fine quality known as 'Seekaparai' is found in many parts of this taluk—particularly at Kannanthangal, Maduraimangalam, Patnoolchatram, Gunakarambakam, Vaipur, etc. This type of clay is found below ground level at depths varying from 2 to 4 feet. In some places it is found in the form of a thick bed.

Commercial value.—The clay is of a fine quality. The preliminary experimental results are promising and the clay is suitable for the manufacture of various grades of stoneware and allied ceramic goods.

Other observations—

Original colour—Slate to light ash.

Colour after baking—Buff.

Clay substance—Not determined.

Impurities—Not determined.

Extent of the deposit.—This clay is reported to occur in beds of varying thickness. For further details, vide Appendix C (Maduraimangalam).

Quarrying and transport facilities.—With the help of the boring results it would be possible to adopt a suitable method of quarrying. The transport problem could be economically solved. The nearest railway stations are Tiruvallur and Kadambattur on the Madras and Southern Mahratta Railway and Vandalur on the South Indian Railway. There are good roads linking up the above stations.

TIRUVALLUR TALUK.

Location and character.—At Athikattur, a village about a mile from the Kadambattur railway station on the Madras and Southern Mahratta Railway and at Kilacheri about 6 miles from the above station, there are valuable beds of ash coloured plastic clay similar to pipe or stoneware clays found in Sriperumbudur taluk. On this spot another inferior type of clay contaminated with a large proportion of iron is also to be found.

Commercial value.—This clay is suitable for the manufacture of various grades of stoneware goods.

Other observations—

Original colour—Ash colour.

Colour after baking—Buff.

Clay substance—Not determined.

Impurities—Not determined.

Extent of the deposit.—A large quantity is available. For further particulars, see Appendix C.

Quarrying and transport facilities.—Could be economically quarried. Labour is cheap and the railway station is only a couple of miles from the spot.

COIMBATORE DISTRICT.

This district is bounded on the north by Mysore and Nilgiris, on the south by the Madura district, on the east by Salem, and on the west by Malabar. This district is rich in highly felspathic rocks suitable for the manufacture of ceramic wares.

POLLACHI TALUK.

The rocks of Anaimalai resemble very much the Cornish stone, which is largely used in the ceramic industry. A similar variety is found practically all over the taluk.

Location and character.—The chief localities are from Angalakurichi to the height of about a couple of miles from the foot of the hill. It is of a light greyish white colour.

Commercial value.—This raw material has not been tested at the Ceramic Experimental Station, but it could be used in place of felspar and cornish stone in the ceramic industry.

Extent of the deposit.—Any quantity can be had.

Facilities for quarrying and transport.—Cheap labour could be had. One man can quarry and load one cart in a day. The roads are very good. The nearest railway station is Pollachi about 15 miles away.

UDAMALPET TALUK.

A similar variety of stone is also found at Sinnaveerampati and at Kannamanayakanur.

Sinnaveerampati.

Location and character.—Found in a bed form below ground level.

Commercial value.—Not determined.

Extent of the deposit.—Any quantity can be had.

Facilities for quarrying and transport.—This bed of rock is within a few yards from the main road and is about $2\frac{1}{2}$ miles from Udamalpet railway station.

Kannamanayakanur.

Location and character.—This bed of rock is just below ground level and could be easily excavated.

It is greyish white in colour with a mixture of flesh coloured felspar.

Commercial value.—Will find a wide use in the ceramic industry and could be used as a substitute for Cornish stone in a ceramic body or glaze.

Extent of the deposit.—Any quantity can be had.

Facilities for quarrying and transport.—The main road is only a few yards from the quarry. The spot is only 2 miles from Udamalpet railway station. Cost of excavation and loading a cart of this material will be about Re. 1 and about 8 annas for cart-hire for conveying the material to the railway station.

DHARAPURAM TALUK.

Kangayam.

Within a radius of 5 or 6 miles round this village large quantities of very useful stones are available.

Location and character.—The Sivamalai, Padyur and Karuttupalayam rocks are practically of one variety. The rocks and other useful stones are found scattered all over the country and also on the top of the hillocks of Karuttupalayam. In Sivamalai in addition to the above, a variety of transparent glasslike pebbles is found in abundance.

Commercial value.—Most of the rocks and stones could be used in the ceramic industry in place of flint and felspar. The chemical analysis of a sample of felspathic rock from Kangayam is included in Appendix B-05B.

Extent of the deposit.—Any quantity can be had.

Facilities for quarrying and transport.—The main road between Kangayam and Tiruppur passes between the above area. The nearest railway station is Tiruppur, which is about 17 miles away.

Kavalaikattuvalasu and Alambadi villages.

Location and character.—The variety of rock found at Kavalaikattuvalasu and Alambadi villages is different from those found at Sivamalai and Padyur. This contains a large quantity of flesh coloured felspar mixed up with other rocks; it is a very valuable raw material and one can safely predict its wide use in the ceramic industry.

Commercial value.—It is a valuable raw material and could be used in place of felspar and Cornish stone.

Extent of the deposit.—A fair amount could be had.

Facilities for quarrying and transport.—This variety is found 10 to 16 feet below ground level. If the material is found to be really useful after necessary experiments, one can quarry and transport the material profitably. Kavalaikattuvalasu is about 7 miles from Kangayam and the nearest railway station is Perundurai about 18 miles away. Alambadi village is about a couple of miles from Kavalaikattuvalasu and about 4 to 5 miles from Kangayam.

CUDDAPAH DISTRICT.

General description.—Cuddapah district lies between 13°43' and 15°14' N. and 77°51' and 79°29' E.

It is bounded on the north by the Kurnool district, on the south by the Chittoor district, on the east by the Nellore district and on the west by the Anantapur district.

The district on the whole is very rich in rocks and clays suitable for the manufacture of high grade ceramic wares. The important clay beds are to be found in Siddhavattam, Rajampet, Vempalli and in Pulivendla taluk—suitable stones and rocks are also available in quantity in Badvel and Rayachoti taluks. For boring results, see Appendix D.

SIDDHAVATTAM TALUK.

Clays.

Location and character.—There is a bed of white coloured clay, very near the Siddhout railway station on the Madras-Bombay line. I was given to understand that similar clay is available in the interior of this taluk also. There is water scarcity in this area.

Commercial value.—Judging from the laboratory tests, and the chemical analysis, this clay is suitable for the manufacture of certain grades of ceramic wares and refractory goods.

For chemical analysis, see Appendix A-013.

Other observations—

Original colour—Buff.

Colour after baking— . . .

Clay substance—61 per cent.

Impurities—39 per cent.

Extent of the deposit.—On examining a pit already excavated near the railway station, I found this variety of clay in a bed form 10 feet below ground level.

Facilities for quarrying and transporting.—This kind of clay occurs near the railway station; therefore it could be economically quarried and transported.

RAJAMPET TALUK.

A variety of clay and stones suitable for the manufacture of high grade porcelain is found in this taluk in large quantities.

Clay.

Location and character.—There is a very valuable bed of white clay in the village known as Hastavaram which is about 5 miles from Rajampet railway station. The plot is comprised in survey number 1. This is being quarried by a firm for the manufacture of stoneware jars, etc. The railway line passes close to the village and the white clay cutting is visible from the train.

The clay is of very fine texture and milk white in colour and occurs below an overburden of red soil which is about 10 to 15 feet in thickness.

Commercial value.—This is a very valuable raw material suitable for the manufacture of high grade ceramic wares such as electrical porcelain sanitary and laboratory wares and other varieties of ceramic articles. For chemical analysis, see Appendix A-014.

Extent of the deposit.—From an inspection made of the excavations already made, this milk white clay is visible below a depth of about 10 feet of red soil and extends to over 30 feet in thickness.

A large quantity of this material is available. In order to determine the extent of this raw material a few borings will have to be put down in the surrounding area.

Quarrying and transport facilities.—This could be quarried by the open pit system as is being done at present. Labour is cheap and the Rajampet railway station is only 5 miles away. The Madras-Bombay main line passes through this village close to the deposit.

Red clay.

A large quantity of red clay suitable for paints and colour washing and for the manufacture of vitrified red flooring tiles is available in this place.

BADVEL TALUK.

White clay.

Location and character.—White clay occurs in pockets in small quantities at a village known as Varikunta which is nearly 10 miles away from Porumamilla very near the Nallamalais. This village is about 30 miles away from Yerraguntla, the nearest railway station.

Commercial value.—This raw material will find a wide use in the ceramic industry. It is used locally as 'moggu' for decorating house fronts.

Extent of the deposit.—The well in the above village which is very deep exposes only a very thin stratum of white clay. To determine the approximate extent of the deposit it would be necessary to put down a few borings.

Quarrying and transport facilities.—If a further investigation by putting down borings reveals a thick bed of white clay it will be worthwhile quarrying.

The village is far away and the road is very bad. The nearest railway station is Yerraguntla about 30 miles away.

PULIVENDIA TALUK.

White clay occurs in this taluk. Owing to limited time at my disposal it was not possible for me to investigate these deposits.

CUDDAPAH TALUK.

Rocks and allied stones.

Location and character.—During the survey I examined the rocks found at Chintakamadina, near about Ganganapalli reserve forest, Kammavaripalli, Lankamalai, Nagasanipalli, Pushpagiri, Kotlur and Chennur. In most cases the rocks are found on the surface and could be easily collected.

Commercial value.—The rocks and stones found in the above places could be used in the manufacture of porcelain body and glazes.

Extent of the deposit.—A very large quantity is available.

Quarrying and transport facilities.—Could be economically quarried and could be transported by means of bullock carts to any central place.

RAYACHOTI TALUK.

Location and character.—This taluk is very rich in rocks and stones containing felspar—the important areas are Rayachoti, Guvvalacheruvu, Veerahalli, etc.

Commercial value.—These rocks can be used in the manufacture of porcelain and glazes in the ceramic industry.

Extent of the deposit.—A very large quantity could be collected.

Quarrying and transport facilities.—The nearest railway station is Cuddapah which is about 28 miles away. The road is good.

BADVEL TALUK.

Location and character.—A variety of white quartz occurs near Porumamilla on the surface.

Commercial value.—This is a good variety of rock rich in silica and free from impurities. This could be used to supply the silica required by the porcelain body of glaze.

Extent of the deposit.—A very large quantity is available.

Quarrying and transport facilities.—The nearest railway station is over 30 miles away and therefore transporting this material will be very expensive. The quarrying could be economically done because of the cheap labour.

PULIVENDLA TALUK.

Sandy earth.

Location and character.—A large bed of very fine sandy earth is found at Ulimela about 2 miles away from the Pulivendla taluk office.

Commercial value.—It is locally used for polishing and cleaning brass vessels. This could be used in the manufacture of bangles and certain varieties of glass and ceramic glazes.

Extent of the deposit.—A large quantity is said to be available but the exact extent will have to be determined by putting down borings or by means of trial pits.

Quarrying and transport facilities.—This deposit could be economically quarried. The earth covering the material is loose and could be easily removed. The nearest railway station is Muddanuru, about 22 miles away on the Madras-Bombay line.

Rajampet.

Location and character.—A very good variety of silicious rock is available at Athirala about 4 miles from Rajampet on the Bestapalli road.

Commercial value.—Suitable for the manufacture of glaze and glass.

The raw materials found in this district are suitable for the manufacture of various grades of ceramic articles. The railway line between Bombay and Madras passes through this district alongside the white clay bed of Rajampet. The raw material could be economically transported by rail. Rajampet has in addition to valuable white clay deposits plenty of water and cheap firewood. Therefore this place is eminently suitable for establishing a ceramic factory.

GANJAM DISTRICT.

This district is bounded on the north by Bihar and Orissa and on the south by Vizagapatam, on the west by the Central Provinces and on the east by the Bay of Bengal.

Clays.

White clay is reported to occur in Chicacole area below ground level. For further details, see Appendix D.

GHUMSUR TALUK.

Rocks and allied stones.

The only mineral I was able to identify is a kind of rock more allied to pegmatite occurring practically all over the country and this material will find a wide use in the ceramic industry. The chief localities are Jillundi and Sisunda.

Location and character.—This raw material occurs at varying depths from 3 to 6 feet below the ground level and is found associated with a poor quality of mica. [S. No. 485 (i) of Jillundi, map No. 265 of Ghumsur taluk.]

Commercial value.—This rock is slightly inferior to that found in the mica mines of Nellore district. Yet it could be used in the ceramic industry.

Extent of the deposit.—The variety of rock occurs practically all over this taluk, therefore any quantity could be had.

Quarrying and transport facilities.—The nearest railway station is about 51 miles away.

THE EAST AND WEST GODAVARI DISTRICTS.

White clay occurs in abundance practically all over the East and West Godavari districts at varying depths. The important beds are to be found near about Rajahmundry and at Dwaraka Tirumalla near Ellore.

Rajahmundry.

Location and character.—There is a very valuable bed of white clay in the village of Bhupallapattanam near Punniakshetram about 6 miles away from Rajahmundry railway station. This bed of clay occurs below varying depths from a couple of yards to 20 to 28 feet below ground level.

Commercial value.—This appears to be a very good variety of pipe clay suitable for the manufacture of stoneware goods, acid jars, telegraphic insulators, fire-bricks, etc. At present the material is largely used in the manufacture of Mangalore pattern roofing tiles at the tile factories near Samalkot for mixing up with the red clay for the manufacture of roofing tiles.

The chemical analysis of the above raw material is included in Appendix A-015.

- Original colour—Light blue.
- Colour after baking—Buff.
- Clay substance—97 per cent.
- Impurities—3 per cent.

Extent of the deposit.—This bed occurs several feet below the ground level. See Appendix C for borings.

Facilities for quarrying and transport.—At present the material is removed in a very crude manner. First of all a pit 5 feet in diameter is dug up until the bed of the required clay is reached, often several feet below the ground level. Then the white clay is removed to the surface, all, by manual labour.

The nearest railway station is Rajahmundry which is about 6 miles away and the raw material could be easily transported by means of bullock carts.

Bommurumetta.

Location and character.—A bed of white clay occurs in the hillock known as Bommurumetta which is about 2 miles away from Rajahmundry. This bed is under a thick overburden of rock, etc.

Commercial value.—This white clay is a good variety and will find a wide use in the manufacture of stoneware jars, insulators, glazed wall tiles, fire-bricks, etc. The chemical analysis of the raw material is included in Appendix A-016.

Original colour—Light blue.

Colour after baking—Light buff.

Clay substance—79 per cent.

Impurities—21 per cent.

Extent of the deposit.—See Appendix C.

Quarrying and transport facilities.—Quarrying is at present done in a very crude manner. First, a wide pit is dug out and the vein of white clay is worked. Since this occurs within two miles from Rajahmundry, this could be economically quarried and transported.

Peddapuram.

Location and character.—There is a bed of white material trapped between a thick overburden of red earth and hard rock on the hillock known as Pandava metta near Peddapuram.

Commercial value.—Looks very much like a good quality pipe clay. The chemical analysis of this sample is reported in Appendix A-017.

Extent of the deposit.—A large quantity could be had. The nearest railway station is Samalkot which is about 3 miles away. Quarrying and transport should be an easy matter.

Dwaraka-Tirumalla.

Location and character.—This place is about 21 miles from Bhimadole railway station and about 30 miles from Ellore. The clay is of very good quality resembling pipe clay. This occurs in the hillock near Dwaraka-Tirumalla and 20 to 30 feet below ground level.

Commercial value.—Will find a wide use in the manufacture of various grades of ceramic goods.

Extent of the deposit.—A very thick bed of this variety of clay seems to occur in that area. For borings—see Appendix C.

Facilities for quarrying and transport.—Since the material is found in a pure state, it is worth transporting any distance—quarrying could also be *economically* done. The nearest railway station is Bimadole about 21 miles away. The road is in good condition.

The Roofing Tile Industry—Godavari district.

There are two small factories manufacturing Mangalore pattern roofing tiles at Samalkot. Both the plants are worked by animal power. The raw materials are the red clay found locally and the white clay from Rajahmundry. First of all the Rajahmundry white clay is made into a liquid with water and is then mixed up with the red clay and passed through a vertical pug mill and stored for a day or so; afterwards this mixture is once more passed through the pug mill for the manufacture of roofing tiles.

There are two old-fashioned up-draught kilns with a capacity to hold about 2,000 to 2,500 tiles. The fuel used is firewood and paddy husk.

At one of the factories a small kiln specially designed to use paddy husk as fuel has been built up.

The roofing tiles manufactured by these two factories find a good sale and fetch Rs. 55 to Rs. 60 per 1,000 tiles. The tiles are also of good quality and of a fairly uniform colour.

GUNTUR DISTRICT.

General description.—This district is bounded on the north by the River Kistna and the Kistna district on the south by the Nellore district, on the east by the Bay of Bengal and on the west by the Kurnool district and the Nizam's Dominions.

The district is rich in white clays. The important areas are towards Mangalagiri and near Guntur and Vinukonda.

GUNTUR TALUK.

Location and character.—White clay is found mixed up with decomposed quartz at varying depths near Guntur and Mangalagiri. The clay is of white colour.

Commercial value.—Not determined.

Extent of the deposit.—Not determined.

Facilities for quarrying and transport.—The raw material occurs within 4 miles from Guntur railway station and near Mangalagiri station. Therefore it could be economically quarried and transported.

Vinukonda.

Location and character.—A highly silicious white substance occurs below ground level at varying depths between 1 to 2 feet. The substance is found mixed up with decomposed rock.

Commercial value.—Not yet determined.

The chemical analysis of this raw material is reported in Appendix A-018.

Extent of the deposit.—This occurs in a wide area. The extent could be determined only by putting down borings and this work could not be carried through.

Facilities for quarrying and transport.—The spot is about one mile from Vinukonda railway station. The roads are good. The Masulipatam-Marmagoa metre gauge line passes very close to this area.

THE SOUTH KANARA DISTRICT.

General description.—This district lies on the western part of this Presidency. It is bounded on the north by North Kanara in the Bombay Presidency, on the south by the Malabar district, on the east by the Mysore State and Coorg and on the west by the Arabian Sea.

It is a low table-land, which spreads from the foot of the Western Ghats off Mysore and Coorg towards the sea forming a long strip of country about 150 miles in length and 25 miles broad in its narrowest and 50 miles in its widest part.

It lies between $12^{\circ} 4' 15''$ and $13^{\circ} 58' 30''$ north latitude and $74^{\circ} 43' 26''$ and $75^{\circ} 44' 31''$ east longitude.

The Western Ghats which separate South Kanara from Mysore and Coorg consist mostly of gneisses and in some parts of crystals of felspar of greenish colour.

Fine transparent clay suitable for clay industries is available in many parts of this district particularly on either side of the rivers. The banks of the Natravati have supplied and are still supplying the bulk of the clay used in the manufacture of the Mangalore pattern roofing tiles.

South Kanara is the first place to see the manufacture of bricks and roofing tiles of Marseilles pattern by means of machinery and on a commercial scale in India.

The process of the above manufacture was kept a secret for a long time but gradually a number of factories cropped up in South Kanara and all over the West Coast.

In Mangalore alone, there are over 30 large tile factories producing roofing and flooring tiles. These clay products were shipped to far away places like Rangoon, Singapore and Australia.

The competition from other parts where similar manufactures have been started, particularly the adjoining district of Malabar has brought about the downfall of this industry.

During the ceramic survey, I made a careful study of the tile industry and conducted a preliminary survey of the ceramic possibilities. I have noticed beds of white clay mixed up with

sandy matter all over the West Coast of South Kanara and rocks rich in felspar are also available in this district. Both these raw materials are required for the manufacture of glazed pottery. Mangalore is eminently suitable for such work. Apart from the raw materials and natural facilities for transporting them, skilled labour is also available in the district. For borings—see Appendix D.

Clays.

Various types of clay are available in South Kanara.

Location and character.—Different types of plastic clay are found on either side of the Natravati and in fields, below varying depths. The top layer is rejected by the tile manufacturers; only the fine plastic clay found below the ordinary soil is worked by them. This plastic clay occurs below 5 or 6 feet. After removing this clay the over-burden is again transferred back and levelled up for cultivation. The beds of plastic clays vary from 2 to 3 feet in thickness.

Commercial value.—The different types of clays found on the banks of the Natravati are used in the manufacture of the well-known Mangalore tiles. It is also possible to manufacture high grade flooring tiles out of the above raw materials. The clay is of fine texture, plastic, and ferruginous without any grit, and of the following colours—black, blue and a mixture of blue and red. The chemical analysis of the blue clay is reported in Appendix A-019.

Extent of the deposit.—The tile manufacturers have nearly exhausted the supply of these types of clays near Mangalore and there will soon be a shortage of these clays.

Quarrying and transport facilities.—The waterways of South Kanara facilitate cheap and easy transport of the raw materials and the finished products.

Urva.

Location and character.—A superior quality white clay occurs as an outcrop at Urva, a place a few miles away from Mangalore.

Commercial value.—This clay is suitable for the manufacture of high grade ceramic ware. The clay is not plastic but various grades of ceramic wares could be made by mixing up a light burning plastic clay.

The chemical analysis of this clay is included in Appendix A-020.

Other observations—

Original colour—White.

Colour after baking—Buff.

Clay substance—94 per cent.

Impurities—6 per cent.

Extent of the deposit.—Not yet determined.

Quarrying and transport facilities.—This bed of white clay occurs near Mangalore. After knowing the exact nature of the bed and soil below, it should be possible to adopt the best method of quarrying.

Puttur.

Location and character.—White clay occurs at the above place at varying depths. The clay is of a very good quality.

Commercial value.—This is a very valuable clay suitable for the manufacture of certain grades and varieties of ceramic wares.

The chemical analysis of the above is included in Appendix A-021.

Original colour—White.

Colour after baking—White.

Clay substance—Not determined.

Impurities—Not determined.

Quarrying and transport facilities.—Could be quarried by open pit system. The roads are good.

KURNOOL DISTRICT.

General description.—This district is one of the four Ceded Districts of this Presidency. The rivers Tungabhadra and Kistna separate it from the Nizam's Dominions in the north, to the south lie the districts of Cuddapah and Anantapur and on the east the Nellore and Guntur districts and on the west the Bellary district. The district lies between $14^{\circ} 53' 45''$ and $16^{\circ} 18' 30''$ parallels of north latitude and $77^{\circ} 24' 15''$ and $79^{\circ} 39' 45''$ meridians of east longitude.

This district is rich in stones and rocks rich in felspar, barytes, white clay, shales and slates, sodium carbonate or tsoudu, salt-petre, etc., all suitable for use in the ceramic and glass industries. For borings—see Appendix D.

CUMBUM TALUK.

Clay—Giddalur.

Location and character.—Giddalur is a railway station. A variety of white clay occurs on the banks of the river close by and in a well about 3 miles away from the railway station. This bed of white clay is found at varying depths below ground level.

Commercial value.—The high percentage of silica and traces of impurities such as iron, lime, magnesia, etc., will qualify this raw material for use in the ceramic industries. This clay will be eminently suitable for the manufacture of refractory goods such as fire-bricks.

The chemical analysis of the above sample of clay is included in Appendix A-022.

Original colour—Light buff.
 Colour after baking—Not tested.
 Clay substance—Not tested.
 Impurities—Not tested.

Extent of the deposit.—This occurs below the ground level. From boring results it would be possible to say approximately the extent of this deposit.

The facilities for quarrying and transporting.—It would be possible to give an opinion only after studying the strata revealed by the contemplated borings. The railway station is about 3 miles away.

KURNOOL TALUK.

Rocks and stones.

Pegmatite.—This material occurs in many localities in this taluk particularly near about Guduru and Konganapadu.

Guduru.

Location and character.—The rock found here is very much like flesh coloured felspar and pegmatite. This valuable material is found as out-crops near the village known as Zulakallu on the way to Polukallu.

Commercial value.—From general appearance it resembles flesh coloured felspar largely used in the ceramic industry. After analysing this sample it would be possible to determine its real commercial value.

Extent of the deposit.—Judging from the visible out-crops one can safely predict the existence of a large quantity of this material. If the analytical results would be found to be satisfactory, further investigations could be taken up in this line.

Facilities for quarrying and transporting.—The road is good. The place is about 20 miles away from Kurnool.

Konganapadu.

Location and character.—This village is about 3 miles from Ulindakonda railway station. On examining the excavations already made by private parties for mica, I found valuable pieces of white pegmatite thrown away along with small bits of mica flakes outside the trial pits.

The commercial value.—This variety is milk white in colour, resembling the white pegmatite found in the mica mines of Nellore district and could be used in the manufacture of high grade ceramic goods and glazes.

Extent of the deposit.—From local enquiries I understand that this material is found in a wide area.

Facilities for quarrying and transporting.—The railway station is only 3 miles away.

KISTNA DISTRICT.

This district is bounded on the north by the Godavari district, on the south by the Guntur district, on the west by the Hyderabad State and on the east by the Bay of Bengal. The eastern half of the Kistna district is very rich in fine plastic clays suitable for the manufacture of terracotta goods, roofing tiles of Mangalore pattern, square and hexagonal flooring tiles, drainage pipes and bricks. This variety of clay is free from any grit and can be readily used in the manufacture of the abovementioned goods. At Masulipatam, the local potters manufacture beautiful dolls and figures out of this clay and paint them with various colours. They are very attractive and very cheap.

Location and character.—This type of clay is generally found in tank and river-beds and sides and is also available in almost all the canals in the district. The colour is from grey to black.

Commercial value.—This type of clay will find a wide use in the manufacture of terracotta wares and other varieties of clay goods mentioned above.

Extent of the deposit.—A large quantity is available.

Quarrying and transporting facilities.—The clay could be economically quarried and transported in boats to any central place.

NANDIGAMA TALUK.

Location and character.—Clays rich in alumina occur in this taluk particularly near Mukthyala, Jayyantipuram and Vadamri. The ash-coloured substance resembling chalk occurs below a couple of feet from ground level.

Commercial value.—Not determined. The chemical analysis of one of the samples collected from Jayyantipuram is included in Appendix A-023.

Extent of the deposit.—Not determined.

Facilities for quarrying and transporting.—The nearest railway station is about 18 miles away known as Bonakalu on the Nizam's State Railway and the spot is about 60 miles away from Bezwada.

MADURA DISTRICT.

This district is bounded on the north by the Coimbatore and Trichinopoly districts, on the south by the Ramnad district, on the east by the Tanjore district and on the west by the Travancore State.

The district is rich in felspathic rocks and clays suitable for the manufacture of high class ceramic wares.

White clay is found in many parts of Periyakulam and Kodai-kanal taluks and granite rocks suitable for the manufacture of ceramic goods are available in many parts of this district.

MADURA TALUK.

Tiruparankunram.—There are traces of white clay at this place.

Location and character.—There is a large area of waste land adjoining the railway line near Tiruparankunram where I noticed a white coloured clay mixed up with red gravel.

Commercial value.—Not yet determined.

Quarrying and transport facilities.—This should be easy if the raw material proves to be of value.

MELUR TALUK.

Rocks.—Suitable for manufacture of ceramic articles occur in this taluk.

Location and character.—Rocks occur in the hill near Chittampatti which is about 10 miles from Madura adjoining the main road between Madura and Melur.

Commercial value.—Will find a wide use in the ceramic industry as a substitute for Cornish stone.

Extent of the deposit.—Any quantity can be had.

Quarrying and transporting facilities.—This should be easy. The main road between Madura and Melur passes by the side of this hill.

PERIYAKULAM TALUK.

A white coloured substance occurs in the above taluk particularly at Chinnamanur.

Location and character.—This white substance occurs on the surface.

Commercial value.—Not determined. The chemical analysis reveals a large percentage of lime and the report of the chemical analysis will be found in Appendix B-06 B.

Extent of the deposit.—Any quantity can be had.

Quarrying and transport facilities.—The locality is about 14 miles away from Theni railway station (South Indian Railway). This matter may be ascertained after knowing its real commercial value....

NILAKKOTTAI TALUK.

Rock.

Location and character.—Between Palayankottai and Mettur there is a bed of mica-bearing pegmatitic rocks. The exact locality is about $2\frac{1}{2}$ miles from Mettur which village is about 4 miles away from Ambatturai railway station (South Indian Railway) and about 5 miles north of Kodaikanal Road railway station (South Indian Railway).

Commercial value.—This material is not as pure as the pegmatite found in Nellore district but will find a wide use in the manufacture of vitrified stoneware and other ceramic wares. The chemical analysis of this material is reported in Appendix B-07 B.

Extent of the deposit.—A large quantity is available.

Quarrying and transport facilities.—The railway station is about $6\frac{1}{2}$ miles away, the roads are good. The material could be worked in open pits.

KODAIKANAL TALUK.

White clay is reported to occur in many parts of the Kodaikanal taluk particularly on the Palni hill side. It was not possible to inspect all the localities.

Location and character.—The cuttings all along the ghat road reveal the existence of kaolin on the Palni hills.

The kaolin on the top of the Kodaikanal hills is stained with a light pink colour.

Father Newton drew my attention to a bed of white clay very near Shembaganur Post office which resembled very much the decomposed Cornish stone from which English kaolin is obtained.

Commercial value.—Seems to be a good quality China clay. Chemical analysis alone will determine its real value. It is locally used for white-washing houses and for building purposes.

Extent of the deposit.—Not yet determined.

Quarrying and transport facilities.—If the material proves to be valuable, it could be economically quarried and transported by means of rope ways.

PALNI TALUK.

Rocks.

Location and character.—Granite rock suitable for the manufacture of ceramic goods is found in large quantities throughout this taluk.

Commercial value.—Suitable for use in the manufacture of ceramic goods.

Extent of the deposit.—Any quantity can be had.

Quarrying and transport facilities.—This material occurs near the railway station and could be economically quarried and transported.

DINDIGUL TALUK.

Rocks.

Location and character.—The granite found in many parts of this taluk is suitable for the manufacture of ceramic wares.

Commercial value.—Could be substituted for Cornish stone in any earthenware body.

Extent of the deposit.—Any quantity can be had.

Quarrying and transport facilities.—Could be economically quarried.

MALABAR DISTRICT.

General description.—This district lies on the western part of the Presidency. It is bounded on the north by South Kanara, on the south by the Cochin State, on the east by the Mysore State and the Coimbatore district and on the west by the Arabian Sea. Like South Kanara, the major part of Malabar is separated from the rest of the Presidency by the Western Ghats, which consist of gneisses with felspar.

Fine plastic clay is available in abundance in this district and is being used in the manufacture of tiles of various designs similar to that produced in the adjoining district of South Kanara.

During the ceramic survey of this district, I had an opportunity of making a close study of the tile industry of this district and I also found valuable deposits of white clay similar to China clay, suitable for the manufacture of high grade porcelain and earthenware. This valuable raw material is found all over the West Coast and in Wynaad and Palghat.

For boring result, see Appendix D.

Location and character.—A variety of white clay is found at Azhikal, Cannanore, Tellicherry, Calicut, Feroke, Parli and at Wynaad. This white clayey substance occurs at a depth of 10 to 20 feet below ground level. In some places it is found mixed up with undecomposed granite rock and in some with particles of mica. The mode of occurrence very much resembles that of the China clay deposits of Cornwall in England.

The white clay occurs in the decomposed rocks mixed up with particles of quartz and mica. The percentage of white clay will be about 10 and the rest is rocky material. This clay substance which is pure aluminium silicate could be separated by washing with water or by the osmosis electrical process. This white clay

substance is kaolin or China clay which is largely used in the ceramic industry and also in the manufacture of paper and textile goods.

Commercial value.—The clay seems to be of a very good quality and when properly treated and purified, will find a wide use in the textile industry and paper manufacture apart from its use in the ceramic industry.

Extent of the deposit.—Large quantities of this material are available practically all over the West Coast. From the cuttings already made in certain localities I observed the bed of white clay varying from 8 to 10 feet in thickness. I was told by the local people that this bed of white clay occurs even up to 20 to 25 feet in thickness.

Facilities for quarrying and transport.—Labour is cheap. The railway runs near the deposits. In addition there are good waterways for transporting the raw materials and the finished goods.

WYNAAD TALUK.

Location and character.—An excellent quality of white clay occurs within a mile on the Mysore road from Sultan's Battery between Mysore road and the Nilgiri road, near Midlands Estate at the 61st mile stone. It is in a private property. This clay is the result of the decomposition of pegmatite rocks and contains fine particles of mica, which could be removed by washing. This material occurs in the form of a thick bed below an over-burden of 8 feet of ordinary soil.

Commercial value.—Not determined.

Extent of the deposit.—I was given to understand that this bed of white clay occurs in the form of a thick bed of about 20 feet in thickness.

Facilities for quarrying and transport.—This place is nearly 60 miles from Calicut. After testing, if this material is found to be useful and occurs in large quantities it could be profitably worked in spite of the long distance.

PALGHAT TALUK.

Parli.

Location and character.—At Parli in Palghat taluk, there is a very good clay which seems to be suitable for the manufacture of ceramic goods. This occurs below a thick over-burden of ordinary soil. The clay is white in colour and is mixed with large pieces of rocks.

Commercial value.—Not determined.

Extent of the deposit.—Not determined.

Facilities for quarrying and transport.—This occurs very near the Parli railway station and can be profitably worked. Labour is also cheap.

The Tile Industry.

The process of manufacture of roofing tiles in Malabar is almost the same as in Mangalore. The tile factories of this district are well distributed throughout the district. There are hardly 15 tile factories in this district, whereas in Mangalore alone there are over 30 tile works. The tile works of Malabar are all fitted up with modern tile making plants and are well organized. Further, in Malabar most of the manufacturers pay greater attention to the mixing up of various types of clay. There is one tile works at Feroke with a special plant for grinding and mixing well of different types of clays before passing the same through the crusher and the pugmill. Their finished product is very strong and has one uniform colour which is very essential.

Only one factory at Feroke, in Malabar, manufactures drain pipes and vitrified flooring bricks, etc.

There are a few tile manufacturers in Malabar who are anxious to introduce in their manufacture other grades of ceramic goods. The proprietors of the Parli tile works are willing to start the manufacture of stoneware jars in their present factory if they are assured of technical help from the Department of Industries. Clay suitable for the above manufacture is also available within a few furlongs from the factory.

The tile factories of Malabar are well distributed and that too all along the railway line, therefore they are able to capture almost all the tile trade of South India apart from their trade all along the West Coast, that is, south of Mangalore, and with Ceylon and Rangoon.

In the Malabar district most of the raw materials suitable for the manufacture of ceramic goods are available in large quantities. Labour is cheap and any quantity of firewood could be had for fuel at a cheap price. The railway runs like a backbone through the Malabar district apart from the good waterways and roads affording good transport facilities both for the raw materials and the finished products.

NELLORE DISTRICT.

General description.—The Nellore district is bounded on the east by the Bay of Bengal, on the west by the Chittoor district, on the south by the Chingleput district and on the north by the Guntur district. The Madras and Southern Mahratta Railway runs through this district from south to north and so does the

Buckingham Canal. This district is noted for mica and is also very rich in pegmatite, a type of felspar found with mica. China clay of good quality also occurs in this district.

ATMAKUR TALUK.

Clays.

Location and character.—At Prabagiripatnam, there is a deposit of a variety of white clay suitable for the manufacture of high grade ceramic ware. This place is 23 miles from Nellore and is about 5 miles towards the north of Podalakuru.

It occurs below 20 to 25 feet under a thick over-burden of rock structure.

Commercial value.—This is a very valuable clay, suitable for the manufacture of high grade ceramic wares.

For chemical analysis, see Appendix A-024.

Other observations—

Original colour—White.

Colour after baking—White.

Clay substance—Not determined.

Impurities—Not determined.

Extent of the deposit.—Not yet determined.

Quarrying and transport facilities.—Quarrying could be carried out in the same manner as it is done in the case of mica. There are good roads leading from this spot to the railway station which is about 23 miles away.

KAVALI TALUK.

(Muthyalpad zamindari.)

Location and character.—At Peddapavani there is a good deposit of white clay. The deposit occurs between Kavali and Peddapavani within a few miles from the zamindar's palace. This occurs in the forest below varying depths.

Commercial value.—This clay is suitable for the manufacture of certain types of ceramic wares. This clay contains a very large percentage of impurities such as fine sand and mica dust.

For the chemical analysis of the washed sample of the above clay, see Appendix A-025.

Other observations—

Original colour—White.

Colour after baking—Light buff.

This clay is not plastic and therefore it would be necessary to add some light burning plastic clay.

Extent of the deposit.—See Appendix C.

Rocks and allied stones—Pegmatite.

Location and character.—This mineral occurs along with mica and is being excavated and thrown away as waste during the mica mining operations. There are two types available. One is milk white in colour and the other green.

Commercial value.—Both the white and green pegmatites could be used in place of felspar in the manufacture of various grades and varieties of ceramic wares. The cost of felspar in England is about £5 per ton (for picked lumps white raw).

For chemical analysis of pegmatite white from Tellabodu mine, Sydapuram, see Appendix B-08 B and for pegmatite green from L. N. mine, Chaganam, see Appendix B-09 B.

Extent of the deposit.—As a very large quantity of this material is thrown away as waste, in all the mica mines of this district, any quantity could be collected from these waste heaps.

Facilities for quarrying and transport.—There is no need for quarrying this material now, since a large quantity is already available in all the mica mines and could be transported to any desired distance.

RAMNAD DISTRICT.

A major portion of this district is under the zamindars. White clay, the chief raw material used in the ceramic industry, is reported to occur below ground level in many parts of the district particularly in the Sivaganga and Ramnad zamindaris.

RAMESWARAM.

Location and character.—There is a deposit of white clay and a variety of stone in Gandamanaparuvadam. The clay occurs below ground level and the spot is about 3 miles away from the railway station.

Commercial value.—The real ceramic value has not yet been determined. The chemical analysis of the clay is reported in Appendix A-026 and of the stone in Appendix B-010 B.

Extent of the deposit.—Any quantity could be had; in order to know the extent or the thickness of the bed of this type of clay a few borings will have to be put down.

Quarrying and transport facilities.—The nearest railway station is Rameswaram which is about 3 miles away.

Other deposits.

White clay is reported to occur in many other localities of this district. A few borings are likely to reveal valuable beds of white clay in the Sivaganga and Ramnad zamindaris.

SALEM DISTRICT.

This district is bounded on the north by the Mysore State, on the south by the Trichinopoly district, on the east by the South Arcot district and on the west by the Coimbatore district. This district is on the whole rich in rocks containing felspar, besides possessing a deposit of magnesite or magnesium carbonate largely used in the manufacture of refractory goods such as fire-bricks, etc., and of a very poor grade China clay

OMALUR TALUK.

Felspathic rocks.

Location and character.—There is a kind of stone very much like a mixture of granite and felspar found in the hills near Enadigramam which is about 6 miles from Omalur.

Commercial value.—From general appearance it looks like a highly felspathic rock and the material will be useful in the ceramic industry.

Extent of the deposit.—Any quantity could be had as the hill itself is formed of this very material.

Quarrying and transport facilities.—There is a good road for over four miles but further on, the tract leading to the hill is suitable for country carts only. If the material proves to be valuable, proper roads could be made for transport. The nearest railway station is Omalur on the Salem-Mettur line, which is about 5 miles from the hill.

THE SHEVAROY HILLS.

Location and character.—This kind of rock is found practically all over the hills.

Commercial value.—Seems to be a fairly good material and suitable for the manufacture of stoneware goods.

Extent of the deposit.—Any quantity could be had.

Facilities for quarrying and transport.—There are very good roads all over the area; if the material is found to be of any use, it could be economically transported to any station. The nearest railway station is Salem which is about 10 miles from the foot of the hills.

NAMAKKAL TALUK.

Location and character.—This taluk is rich in felspathic granite rocks which are found practically all over the country between Namakkal to Paramati and Paramati to Pamagoundapalaiyam.

Commercial value.—Not determined.

Extent of the deposit.—Any quantity could be had.

Facilities for quarrying and transport.—There are good roads all over the place and this material could be transported to any distance by motor trucks. The nearest railway station is Sankaridrug, nearly 30 miles away.

TIRUCHENGODE TALUK.

Arasaramani.

Location and character.—There is a large deposit of pegmatite associated with mica at this place. The spot is about 6 miles from Iddapadi, an important trade centre. This material occurs 10 or 15 feet below the ground level.

Commercial value.—Not determined.

Extent of the deposit.—A large quantity could be had at the above place and in the surroundings.

Facilities of quarrying and transport.—The road leading to the deposit is good. The nearest railway station is Sankaridrug on the Erode-Salem line.

UTTANGARAI TALUK.

Location and character.—Between Morappur and Harur there is a range of hill having a white colour. It is visible from the road running between Morappur and Harur at about the third mile from Morappur railway station towards the south.

Commercial value.—The rock seems to be of pure silica, which could be used largely in the manufacture of ceramic and glass goods.

Extent of the deposit.—Any quantity could be had.

Facilities for quarrying and transport.—The Morappur railway station is only 4 miles from this bed of rock and the material could be easily quarried and transported.

DHARMAPURI, HOSUR AND KRISHNAGIRI TALUKS.

Location and character.—All the above taluks contain any quantity of rocks rich in felspar.

Commercial value.—The above variety of rocks could be used in the manufacture of various grades of ceramic goods.

Extent of the deposit.—Any quantity could be had.

Facilities for quarrying and transport.—There are very good roads leading to all parts of the district. There is a railway running from Hosur to Morappur via Dharmapuri. Krishnagiri is linked up to Tiruppattur junction by a light railway.

HOSUR TALUK.

White clay or Kaolin.

Location and character.—A variety of white stuff occurs below 6 to 8 feet of ordinary earth south-west of Hosur. The localities inspected by me are Kalkondapalle, Chinna Belagondapalle and Punapalle towards Mysore frontier and at Yedaiyanallur near Mattigiri.

Commercial value.—The clay found near Punapalle and Chinna Belagondapalle is milk white in colour, containing grit, and if properly treated it could be used in the ceramic industry. The others are very inferior. Not yet tested.

Extent of the deposit.—This bed of clay covers a large area and if it is found useful after experimenting, the approximate quantity of this white material could be determined. See Appendix C for borings.

Facilities for quarrying and transport.—The nearest railway station is Hosur which is nearly 7 miles away from that area. There are good roads all over this taluk for transporting the material by motor trucks.

Magnesite.

At Suramangalam there is a very pure deposit of magnesium carbonate which is being worked by the Salem Magnesite Syndicate.

At present they quarry and calcine the material and export after grinding it into fine powder.

It is possible to manufacture refractory bricks out of this magnesite. The magnesite used by the magnesite brick works at Pisa in Italy is of an inferior quality to that of Salem. The Salem variety is very pure.

Other uses—Sorel cement.—This is a kind of cement discovered by Sorel, a Frenchman. It is nothing but a mixture of lightly calcined magnesite and magnesium chloride (which can be substituted by 'bitterns' the liquid left in the salt pans after the common salt is removed). This cement when properly made will be harder than the ordinary Portland cement. This has got a great binding power. One part of this cement and 10 parts sand will give a solid strong flooring. This could be used in the manufacture of glazed wall tiles, floorings, saw dust floorings, artificial marble, emery and corundum wheels and grind stones largely used in workshops, etc.

TANJORE DISTRICT.

This district is bounded on the north by the South Arcot district, on the south by the Ramnad district, on the west by the Madura and Trichinopoly districts and on the east by the Bay of Bengal. A peculiar white substance occurs in many parts of the Tanjore taluk, particularly near Reddipalaiyam.

Reddipalaiyam and Sivajipuram.

Location and character.—This material is found below three or four feet from the ground level at the above places which are about $3\frac{1}{2}$ and $1\frac{1}{2}$ miles from Tanjore. The colour ranges from light blue, red, to pure white.

Commercial value.—Although this substance looks like clay, it will not be possible to judge its real commercial value before submitting the sample to various ceramic tests.

The chemical analysis of this material is reported in Appendix A-027.

Extent of the deposit.—A large quantity of this material seems to exist in the area. A few borings will reveal the extent of the deposits.

Facilities for quarrying and transporting.—Judging from the excavations already made for the Grand Anicut Canal, it is seen that it will be possible to quarry this material economically; while transport should be easy since there is a good road running to the very locality which is about 4 miles from Tanjore railway station.

Karunanandapuram.

Pure white clay resembling kaolin occurs in the garden of Abraham Pandithar which is about two miles from Tanjore railway station.

Location and character.—This pure white kaolin-like substance occurs 30 to 35 feet below ground level. The percentage of clay substance is rather low because it is found mixed up with a very high percentage of quartz sand.

Commercial value.—This material from general observations and from the preliminary tests made on the spot reveals a high ceramic value. Unfortunately the percentage of clay substance is not much and the material itself occurs much below the ground level.

Extent of the deposit.—This bed of clay occurs several feet below ground level; borings alone can determine their extent.

Facilities for quarrying and transport.—Since the percentage of clay substance is very little, it is not worthwhile quarrying unless the chemical analysis reveals a special value.

Vallam.

Location and character.—I understand that there is a deposit of white clay bed much below ground level. The excavations from a well near Mariamman Koil indicates the presence of white clay. It is about 7 miles from Tanjore.

Commercial value.—A sample of the white clay could not be got because it has got mixed up, with other coloured clays thrown out during the excavations. The chemical analysis is reported in Appendix A-028.

Extent of the deposit.—See Appendix C.

Quarrying and transport facilities.—If the material is found useful and found in abundance, quarrying and transporting could be economically solved.

Pattukkottai.

Location and character.—A bluish white clay mixed up with a large proportion of sand is found in many parts of this taluk particularly near Papanad and Ambalaputhu between Tanjore and Pattukkottai.

Commercial value.—The clay is of a plastic nature and suitable for the manufacture of certain grades of ceramic articles. Owing to the high percentage of sand it may not be profitable to wash out the clay.

Extent of the deposit.—A large quantity is available.

Quarrying and transport facilities.—The clay occurs very near the main road running between Tanjore and Pattukkottai, and below a depth of a couple of feet.

Arantangi.

Location and character.—A white coloured clay occurs at Kurumbur, Yarakkam, Pallayavanam, Sathaniarkoil, and at Ponnambalam, all at a distance of about 8 miles from Arantangi railway station between Arantangi and Pudukkottai.

Commercial value.—From general appearances it seems to be of a good quality. The chemical analysis of a typical sample from Sathaniarkoil is reported in Appendix A-029.

Extent of the deposit.—The material is found at different places.

Quarrying and transport facilities.—There is a good road running near the deposits. If the materials are found to be suitable, this deposit can be economically quarried and the clay transported easily.

Reddipalaiyam—Stones.

Location and character.—Found in the cuttings in new cana about $3\frac{1}{2}$ miles from Tanjore.

Commercial value.—A very valuable raw material suitable for use in ceramic industry. The chemical analysis is included in Appendix B-011 B.

Extent of the deposit.—A large quantity is available.

Facilities for quarrying and transport.—This occurs at varying depths below ground level. The roads are good and the exact spot is only $3\frac{1}{2}$ miles away from the Tanjore railway station.

 TINNEVELLY DISTRICT.

During the survey of this district, I have examined various kinds of clay, rock and sand in the taluks of Tinnevelly, Ambasamudram, Tenkasi, Nanguneri, Tiruchendur and Sankaranayanarkoil. Some of the raw materials could be used in the ceramic industry.

TINNEVELLY TALUK.

Ramayyanpatti.

Location and character.—Limestone of the pure white crystalline variety occurs in fields (bearing the following survey numbers 388/3, 5.21 acres and 512, 5.16 acres) near Sethurayaputhur which is 3 miles away from Ramayyanpatti village. The nearest railway station is Tinnevelly junction which is 3 miles from Ramayyanpatti and 6 miles from the limestone deposits.

Commercial value.—A very good quality; will find a wide use in the ceramic industry.

Extent of the deposit.—On examining the excavations already made, one can safely predict the existence of a large quantity. For determining the extent of their deposits a few borings will have to be put down.

Quarrying and transport facilities.—This raw material will have to be quarried in open pits as is now being done. The nearest railway station is Tinnevelly junction which is nearly 6 miles away.

TENKASI TALUK.

Mathalamparai.

Location and character.—There is a peculiar buff coloured clay found in the village of Mathalamparai about 3 miles from Tenkasi railway station. This material is found a few feet below ground level.

Commercial value.—The chemical analysis of this sample has revealed a high percentage of lime and is reported in Appendix A-030.

Quarrying and transport facilities.—If the material gives satisfactory results, this part of the work could economically be solved. There is a good road leading to the above place and the locality is only a few miles from Tenkasi railway station.

Surandai.

Location and character.—White coloured clay is found in the place above named. The nearest railway station is Pavurchatram which is nearly 8 miles away.

Commercial value.—From general appearance the clay seems to be of a good quality.

Extent of the deposit.—See Appendix A.

Quarrying and transport facilities.—This type of clay occurs below ground level.

AMBASAMUDRAM TALUK.

Kalladaikurichi.

Location and character.—A pure variety of limestone occurs in this place. This place is about 8 miles from the railway station.

Commercial value.—A very good quality suitable for use in ceramic industries.

Extent of the deposit.—A large quantity is available; at present it is largely quarried for the manufacture of lime.

Quarrying and transport facilities.—This could be done by open pits and the railway station is within a mile.

Singampatti.

Location and character.—A peculiar white clay occurs at Uttukuli and surroundings near Singampatti. It occurs below a couple of feet from ground level. The clay is dirty white in colour.

Commercial value.—Not determined. The chemical analysis of this material is reported in Appendix A-031.

Extent of the deposit.—It was not possible to form any idea as to the extent of the deposit from the excavations already made. A few borings alone will reveal the exact nature of the strata below ground level.

Quarrying and transport facilities.—After knowing the exact thickness of the bed of white clay (by putting down a few borings) a suitable economical method could be adopted. The nearest railway station is about 2 to 2½ miles.

SANKARANAYANARKOIL TALUK.

Vasudevanallur.

Location and character—A white hard substance occurs at Namatherai in Vasudevanallur. The nearest railway station is Sankaranayanarkoil, about 14 miles away by road.

Commercial value.—It is milk white in colour. The chemical analysis has revealed a high percentage of magnesia which is a very valuable mineral. The chemical analysis is reported in Appendix B-012 B.

Extent of the deposit.—This type of clay is supposed to occur below 40 to 50 feet from ground level. This material was once quarried and exported a few years ago. No work is being done now.

Quarrying and transport facilities.—Before knowing the thickness of the bed of white substance it will not be possible to suggest any method for quarrying. Further, the locality is in the reserve forest and there is no proper road leading to that locality. It is possible to transport the clay by means of rope ways.

NANGUNERI TALUK.

Location and character.—A white substance occurs near Palavur, a place on the main road from Nanguneri. The village is about 24 miles from Nanguneri and about 44 miles from Tinnevely the nearest railway station. This clayey substance occurs below ground level.

Commercial value.—The chemical analysis of this material is reported in Appendix A-032 which reveals a high percentage of lime.

Extent of the deposit.—Not yet determined.

Quarrying and transport facilities.—This could be quarried in open pits. The nearest railway station is about 44 miles away.

TIRUCHENDUR TALUK.

Location and character.—A peculiar kind of light coloured clay occurs near Tiruchendur at Vanantheraivalai, about half a mile towards the south of Tiruchendur and at Kandaswamipuram, about 2 miles towards the north-west of Tiruchendur.

Commercial value.—This clay is suitable for use in the ceramic industry. The chemical analysis of this variety of clay has revealed a high percentage of lime and is reported in Appendix A-033.

Extent of the deposit.—A large quantity could be had.

Quarrying and transport facilities.—The nearest railway station is only 2 miles away.

TRICHINOPOLY DISTRICT.

General description.—This is an inland district in the south of the Presidency lying between $10^{\circ} 16'$ and $11^{\circ} 32'$ N. and $77^{\circ} 45'$ and $79^{\circ} 30'$ E. It is bounded on the north by the Salem and South Arcot districts, on the west by the Coimbatore and Madura districts and on the south and east by the Pudukkottai State and the district of Tanjore.

The River Cauvery divides the district into two distinct divisions, namely, the northern and the southern divisions.

The northern division—The western half of the division consists chiefly of older archæan gneisses and granites and the eastern half which is formed of sedimentary deposits, is rich in ceramic raw materials, such as pipe clay, gypsum, silicious rocks and stones.

The southern division which is on the south of the Cauvery consist mainly of archæan rocks, granites and gneisses which are also ceramically important.

During the ceramic survey more attention was devoted to the north-eastern portion of the district, i.e., towards Karai, Terani, Ariyalur and Vilangudi side. Since the district was surveyed, it has been brought to my notice that white clay is reported to have been found during boring operation by the Engineering section at Bikshandarkoil in Lalgudi taluk and at Karutharasanallur and at Panchapur in Trichinopoly taluk. For borings, see Appendix D.

PERAMBALUR TALUK.

No. 99. Karai village.

White clay occurs in many parts of this village below ground level at varying depths.

Location and character.—This village is about 9 miles south of Perambalur and about 5 miles north-east of Padalur. The clay is found in the following S. Nos. 533/1, 584/1-2 and 585/1 below a depth of 3 to 4 feet from the ground level. The excavation already made indicates the existence of a thick bed of this valuable raw material. This kind of clay could be traced as far as Vilangudi in the Udaiyarpalayam taluk, which is about 20 miles towards the east and as far as Terani and Uttathur, about 9 miles towards the south.

Commercial value.—The clays found at Karai village are suitable for the manufacture of high grade ceramic wares. The chemical analysis of the clay found in the plot bearing S. No. 533/1 is reported in Appendix A-034.

Original colour—Light ash to bluish colour.

Colour after baking—Buff.

Clay substance—95 per cent.

Impurities—5 per cent.

Samples of this clay were submitted to various ceramic tests at the Ceramic Experimental station at Washermanpet and found to be a very suitable raw material for the manufacture of ceramic goods of various grades.

The other sample of clay which is found in land bearing S. No. 585/1-2 has been analysed and is included in Appendix A-035.

Original colour—Light ash to blue.

Colour after baking—Light buff.

Clay substance—96.00 per cent.

Impurities—4.00 per cent.

This sample was also submitted to various ceramic tests and found to be an excellent clay suitable for the manufacture of ceramic wares of high quality. The clay is non-plastic.

Extent of the deposit.—The presence of white coloured clay at Vilangudi which is 20 miles away from Karai indicates the existence of this type of clay in a wide area. Unless the thickness of this bed of clay is known it will not be possible to determine the extent of this raw material. At Karai the white clay is found below 3 or 4 feet, whereas at Vilangudi similar clay is supposed to occur below 35 feet. See Appendix C for borings.

Quarrying and transporting facilities.—At Karai quarrying could be done by the open pit system, whereas at Vilangudi the clay will probably have to be mined just as coal is mined. It will be possible to decide the best method of extraction only after putting down a few borings.

The Karai clay bed is about 6 miles from Padalur which is on the main road to Trichinopoly about 24 miles away.

UDAIYARPALAIYAM TALUK.

Clay resembling the Karai variety occurs at Vilangudi.

Location and character.—This type of clay is found in many parts of this taluk. From local enquiries I understand that this white clay occurs below 35 feet at Vilangudi, a place about 15 miles from Ariyalur railway station on the Villupuram-Trichinopoly line. The clay is very fine without any gritty matter and is very much like the Karai clay.

Commercial value.—This white clay is being quarried now for the purpose of manufacturing 'Namum sticks' the square-shaped pyramids measuring about 4 inches in length and about half an inch square at the base and gradually tapering to a point, used by the Vaishnavites for their caste marks.

The clay is first of all cleaned by careful washing and a small quantity of camphor and of other perfumes is added before shaping the clay into 'Namum sticks.' Small boys are engaged in this

cottage industry and are paid a few annas per 1,000 sticks as wages. At present the clay is used only for this purpose and a large trade is being carried out in this small cottage industry.

The chemical analysis of this sample is included in Appendix A-036.

- Original colour—White.
- Colour after baking—White.
- Clay substance—48.12 per cent.
- Impurities—51.88 per cent.

This clay is suitable for the manufacture of high grade ceramic goods.

Extent of the deposit.—The clay is reported to occur below 35 feet; it will not be possible to safely predict its extent.

Quarrying and transport facilities.—At present quarrying is being done in a very crude way. First of all the workmen dig a pit of about 10 feet in diameter until the bed of white clay (i.e., about 35 feet from ground level) is reached and then white clay is quarried by workmen without paying any attention to the layer of clay above the seam of the clay that is being worked. It is very unsafe to work like this. I understand that some workmen got buried alive at this place. It may be possible to adopt modern mining methods.

The roads are in good condition.

Rocks and stones suitable for use in the ceramic industry.

Location and character.—Rocks rich in felspar occur in many parts of this district. The important localities are Manaparai, Ottathur and Perugamani. The rocks are highly felspathic. The stone found at Othakovil has revealed a high percentage of lime and is not felspar. The chemical analysis of this rock is reported in Appendix B-013B.

Commercial value.—These rocks could be used in place of cornish stone and felspar in the manufacture of porcelain and other ceramic articles. At present these rocks are used as road metal.

The extent of the deposit.—Any quantity could be had.

Quarrying and transport facilities.—There are good roads all over this district. Quarrying and transport problem can be economically solved.

Sendurai.

Location and character.—There is a variety of stone deposits embedded in red earth near Kurichikulam about 6 miles from Sendurai, a railway station on the Villupuram-Trichinopoly chord line. The stone is of a light red colour, very hard and found in fragments of different sizes.

Commercial value.—This stone will find a use in the manufacture of certain grades of pottery but the presence of iron will prevent its wide use in the manufacture of high grade wares.

The chemical analysis of the above stone is included in Appendix B-014B.

The preliminary ceramic tests made with this material at the Ceramic Experimental station are promising.

Extent of the deposit.—This material is found scattered all over the area. A large quantity could be collected.

Quarrying and transport facilities.—This could be quarried in open pits. The roads are good and the nearest railway station Sendurai is about 6 miles away.

Gypsum.

Gypsum or calcium sulphate CaSO_4 from which plaster of paris is manufactured is found in Perambalur taluk.

Location and character.—This mineral occurs on a variety of clay beds very near the village of Karai bearing the village No. 99 in Perambalur taluk in Trichinopoly district at the localities bearing the following S. Nos. 560 to 565 and 549 to 559. This material is also found at Ottathur in the same taluk and at Maravathur in Udaiyarpalayam taluk.

Commercial value.—Being found in clay beds, this material needs cleaning before it could be used for the manufacture of plaster of paris. It has a high commercial value. It will find a wide use in the manufacture of moulds and for the manufacture of ceramic articles, of dolls, figures and models.

A fair quantity of this raw material is being consumed annually by the crayon and school chalk manufacturers of Kumbakonam in Tanjore district and Ariyalur in Trichinopoly district.

Extent of the deposit.—This material is found in a wide area. Therefore a fair quantity could be collected every year.

Quarrying and transport facilities.—This occurs in the form of thick cakes on the surface of the soil; therefore this material will have to be collected by means of manual labour and could be easily transported by means of country carts. From Karai to Padalur, a distance of 6 miles, the road is not good. From Padalur to Trichinopoly, a distance of about 24 miles, the road is very good.

This district is very rich in raw materials suitable for the manufacture of high class ceramic articles. The roads are all well maintained and labour is cheap.

VIZAGAPATAM DISTRICT.

This district is bounded on the north by the Ganjam district, on the south by the Godavari, on the west by Central Provinces and on the east by the Bay of Bengal.

For borings, see Appendix D.

CHODAVARAM.

Location and character.—There is a deposit of white clay in decomposed rock resembling china clay in the Benihalli hills about 6 miles from Chodavaram.

This material occurs at about 150 to 200 feet above the ground level nearly half way up the hill mentioned above. There is an over-burden of rocks and other material on the top of this white stuff.

Commercial value.—The above clay is suitable for the manufacture of certain types of ceramic wares. The chemical analysis of this sample is included in Appendix A-037.

Extent of the deposit.—Occurs in very large quantities.

Quarrying and transport facilities.—It should not be difficult to quarry and transport the material if it is found to be of any use after actually testing.

Kinthada and Kotapad.

Location and character.—White clay material is not very promising. It contains a greater proportion of quartz crystals and a very minute quantity of china clay, and occurs on the top of a hill over 200 feet high.

Commercial value.—The clay substance is suitable for use in the ceramic industry. The chemical analysis is reported in Appendix A-038.

Extent of the deposit.—Any quantity can be had.

Quarrying and transport facilities.—The deposit is nearly 13 miles away from Chodavaram and from Chodavaram the nearest railway station is Anakapalle which is nearly 11 miles away.

NARASAPATAM.

Balligattam.

Location and character.—There is a peculiar kind of ash coloured clay occurring on the hillock near Balligattam which is about 2 miles from Narasapatam.

Commercial value.—A highly silicious clay, which will be suitable for the manufacture of ceramic goods. The real value has not yet been determined. The chemical analysis is reported in Appendix A-039.

Extent of the deposit.—A large quantity could be had.

Quarrying and transport facilities.—If the material is found to be useful it could be economically quarried and transported.

Pakalapadu.

Location and character.—A white coloured substance containing a large percentage of gritty matter occurs at the above village which is about 5 miles from Narasapatam.

Commercial value.—Not determined.

Extent of the deposit.—Any quantity could be had.

Quarrying and transport facilities.—The exact locality is within half a mile from the main road running between Krishna-devipeta and Narasapatam and about 5 miles to Narasapatam.

ANAKAPALLE.

Rajapallayam.

Location and character.—A white coloured gritty substance being a mixture of quartz and clay substance occurs in the hill in the above village.

Commercial value.—The clay substance resembles china clay and is of a pure quality. It could be used in the manufacture of earthenware and other ceramic goods. The chemical analysis of this sample is reported in Appendix A-040.

Extent of the deposit.—A large quantity could be had; further investigation such as the exact extent of the deposit could be undertaken after actually testing the raw material.

Quarrying and transport facilities.—The nearest railway station is Tadi which is only a few furlongs away from the hill where the deposit occurs.

VIZAGAPATAM.

Location and character.—The excavations of the harbour authorities round about Vizagapatam reveal small pockets of white clay-like substance enclosed between the rocks.

Commercial value.—The proportion of clay substance in the deposit is very small and further it is mixed up with impurities such as iron.

Extent of the deposit.—Available in small quantities only.

Quarrying and transport facilities.—Within a few furlongs from Vizagapatam railway station.

JEYPORE SAMASTHANAM.

Report on the ceramic tests made with the Jeypore clays sent by the Raja Sahib.

Koraput—Bag No. 1.

White clay—Location and character.—A dirty white clay is found towards the north-east of the town at a distance of about 2 miles.

Ceramic value.—The percentage of clay substance—93·5. The percentage of impurities—6·5.

This sample of clay was subjected to various ceramic tests and found to be suitable for the manufacture of high class ceramic articles such as teapots, cups, glazed wall tiles and other grades of pottery ware. The chemical analysis of this sample of clay is reported in Appendix A-041.

Putraguda—Bag No. 2.

Black clay—Location and character.—A black coloured clay is found at a distance of 1½ miles from Jeypore (towards north-east).

Ceramic value.—This sample was submitted to various ceramic tests. The results are not promising. The clay is not suitable for the manufacture of roofing tiles or for any high class work; but suitable for brick manufacture.

Christian street—Bag No. 3.

Ash coloured clay—Location and character.—This clay is found within half a mile from the Samasthanam office, Jeypore.

Ceramic value—

Percentage of clay substance—70·5.

Percentage of impurities—29·5.

The clay is very plastic, experiments made out of the above samples are not very promising. The clay is suitable for mixing up with other clays for manufacturing roofing tiles. The chemical analysis of this sample is reported in Appendix A-042.

Goverdanamunda—Bag No. 4.

Yellowish dirty white clay—Location and character.—This clay is found opposite to Marsh Choultry, Jeypore.

Ceramic value—

Percentage of clay substance—40.

Percentage of impurities—60.

Although this raw material contains as much as 60 per cent of impurities, the experimental results are very satisfactory and this clay is suitable for the manufacture of roofing tiles of Mangalore pattern and other Terracotta goods of high quality. The chemical analysis of this sample of clay is reported in Appendix A-043.

Goverdanamunda S.W.—Bag No. 5.

Yellowish dirty white clay found opposite Marsh Choultry, Jeypore.

Ceramic value—

Percentage of clay substance—42·5.

Percentage of impurities—57·5.

The experimental results are very satisfactory and the clay is suitable for the manufacture of high class roofing, flooring and other Terracotta wares. The chemical analysis of this sample is reported in Appendix A-044.

Kaliguda at Nowrangpur—Bag No. 9.

White clay—Location and character.—This raw material is found at a distance of 2 miles towards the south of Nowrangpur.

Ceramic value.—This clay has yielded very satisfactory results and is a very valuable raw material for the manufacture of high class porcelain and other grades of ceramic articles like the Koraput clay. The chemical analysis of this sample of clay is reported in Appendix A-045.

Kumbaribasa—Bag No. 11.

Location and character.—Found towards the north of Guest House, Jeypore.

Ceramic value.—The experimental results are very satisfactory. Is an excellent clay for the manufacture of roofing tiles and Terracotta wares.

Kumbarisi hamlet—Bag No. 12.

Location and character.—Found at a distance of 2 miles south-east of Jeypore.

Ceramic value.—The experimental results are very satisfactory. The clay is excellent for the manufacture of roofings of Mangalore pattern and other Terracotta wares.

Samples of articles made out of the above samples of clays have been glazed and sent to the Raja Sahib.

CERAMIC SURVEY.

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Appendix 'A'—Chemical analysis of clay.

Number.	Loss on Ignition.	Silica SiO ₂ .	Iron Fe ₂ O ₃ .	Alumina Al ₂ O ₃ .	Lime CaO.	Magnesia MgO.	Alkalies Na & K.	Total.
01	16.20	43.76	7.40	12.54	7.62	Traces	12.39	100.00
02	15.26	47.85	..	32.79	..	..	4.01	100.00
03	16.13	48.15	1.91	33.86	..	..	..	100.05
04	9.76	58.41	7.91	18.99	0.59	..	..	100.00
05	15.02	50.23	7.97	19.43	1.96	4.34	..	100.00
06	10.65	56.98	8.16	18.52	0.75	5.39	..	100.00
07	13.47	40.44	8.69	22.33	1.24	4.94	..	100.00
08	14.94	43.90	1.14	37.95	1.55	Traces	9.67	100.00
09	2.63	68.68	3.87	24.19	Traces	..	0.42	100.00
010	25.00	32.03	1.73	7.63	31.08	..	0.63	100.00
011	11.92	56.52	1.30	24.68	..	1.53	Copper traces.	100.00
012	18.24	50.34	1.34	26.78	1.04	1.22	4.36	100.00
013	4.11	72.14	4.51	14.23	3.80	1.48	0.67	100.00
014	5.13	70.60	Traces	16.68	0.74	0.84	0.87	100.00
015	12.37	62.87	7.30	25.04	Traces	1.11	5.74	100.00
016	12.91	42.16	2.26	37.79	..	Traces	2.42	100.00
017	18.55	40.07	15.58	20.21	0.05	1.56	3.32	100.00
018	4.40	64.70	3.07	9.12	2.76	Traces	5.54	100.00
019	8.91	19.34	30.42	31.86	0.67	2.09	13.77	100.00
020	12.2	51.59	19.26	12.42	1.49	3.05	4.58	100.00
021	10.83	52.98	0.82	32.56	0.43	3.04	1.17	100.00
022	6.98	69.47	0.22	15.38	0.06	0.97	1.41	100.00
023	4.55	65.30	2.45	22.96	Traces	0.84	7.05	100.00
024	15.83	43.86	..	38.18	..	..	4.74	100.00
025	11.72	46.87	..	38.85	3.44	1.45	0.88	100.00
026	22.97	32.83	1.67	9.26	80.60	..	..	100.00
027	16.52	41.02	3.10	37.20	..	Traces	2.67	100.00
028	23.28	51.07	2.76	21.47	Traces	..	2.16	100.00
029	11.05	47.59	1.90	30.60	..	..	1.42	100.00
030	28.03	12.91	4.34	14.37	1.54	..	7.34	100.02
031	36.83	15.90	14.69	10.83	36.88	2.60	0.92	100.00
032	30.00	18.65	2.69	10.14	20.31	..	..	100.00
033	18.43	45.81	0.21	11.03	13.27	5.08	2.27	100.00
034	18.87	49.48	18.81	14.31	Traces	..	6.69	100.00
035	14.46	47.92	2.07	29.68	3.69	3.53	..	100.00
036	15.18	45.16	1.27	36.15	1.32	1.40	..	100.00
037	11.1	62.6	0.15	23.9	1.6	..	0.83	100.65
038	5.08	62.09	..	22.44	..	1.3	..	100.00
039	8.23	58.07	19.16	10.33	4.12	..	10.89	99.96
040	6.00	74.30	0.30	18.9	1.2	1.00	..	99.7
041	15.20	42.31	13.12	29.36	0.74	..	..	100.73
042	5.81	67.63	7.88	14.68	4.68	..	..	100.43
043	4.86	59.89	8.28	19.06	3.38	..	4.40	100.00
044	5.13	73.30	2.91	13.24	2.46	0.75	2.21	100.00
045	15.50	41.18	10.37	32.95	0.71	..	..	100.71

Appendix 'B'—Chemical analysis of rocks and stones.

Number.	Loss on ignition.	Silica SiO_2 .	Iron Fe_2O_3 .	Alumina Al_2O_3 .	Lime CaO .	Magnesia MgO .	Alkalies Na \& K .	—	—	Total.
01B	38.92	9.55	0.69	4.02	45.67	1.13	..	..	..	100.00
02B	10.52	45.09	0.94	10.68	4.16	1.71	26.9	..	..	100.00
03B	1.37	72.47	1.24	14.00	1.78	9.14	..	..	..	100.00
04B	0.6	35.5	11.00	24.00	13.00	7.00	..	Pb	..	100.01
05B	1.28	70.26	1.40	16.44	4.80	..	5.73	..	..	100.00
06B	59.17	14.22	Traces	3.91	22.79	Traces	..	..	..	100.09
07B	0.45	62.20	..	20.22	..	Traces	17.13	..	..	100.00
08B	1.26	65.82	0.66	14.36	0.88	Traces	8.31	3.23	..	100.52
009B	1.04	53.55	Traces	16.39	..	0.52	28.5	..	..	100.00
010B	38.63	6.12	Traces	6.35	43.90	Traces	5.00	..	..	100.00
011B	1.16	89.91	1.85	8.47	..	..	3.61	..	..	100.00
012B	46.85	9.88	2.55	..	..	41.39	..	..	..	100.47
013B	43.49	6.40	0.89	1.16	48.59	..	..	..	..	100.50
014B	2.80	35.31	3.18	1.60	1.29	..	6.02	..	..	100.00

APPENDIX C.

Borings put down by the department in connexion
with the Ceramic Survey.

APPENDIX C.
CERAMIC SURVEY.
1930-1933.

SKETCH OF BOREHOLE PUT DOWN.

District—South Arcot.

Hand boring set— No. 57.

Taluk—Cuddalore.

Diameter of borehole— 4 inches.

Village—Thirumanikuli.

0' 0"

Ground level.

Site of boring (survey number, etc.)—Near temple, Nattam poramboke.

Nearest railway station—Nellikuppam.

6' 0"

Red gravel.

Dates of boring—

When started—21-12-32.

When finished—2-1-33.

13' 0"

Sembarai stone.

18' 0"

Hard yellow clay.

20' 0"

Hard dim white clay.

25' 0"

Hard dim red clay.

28' 0"

Hard violet clay.

32' 0"

Red and white clay mixed.

47' 0"

Red clay.

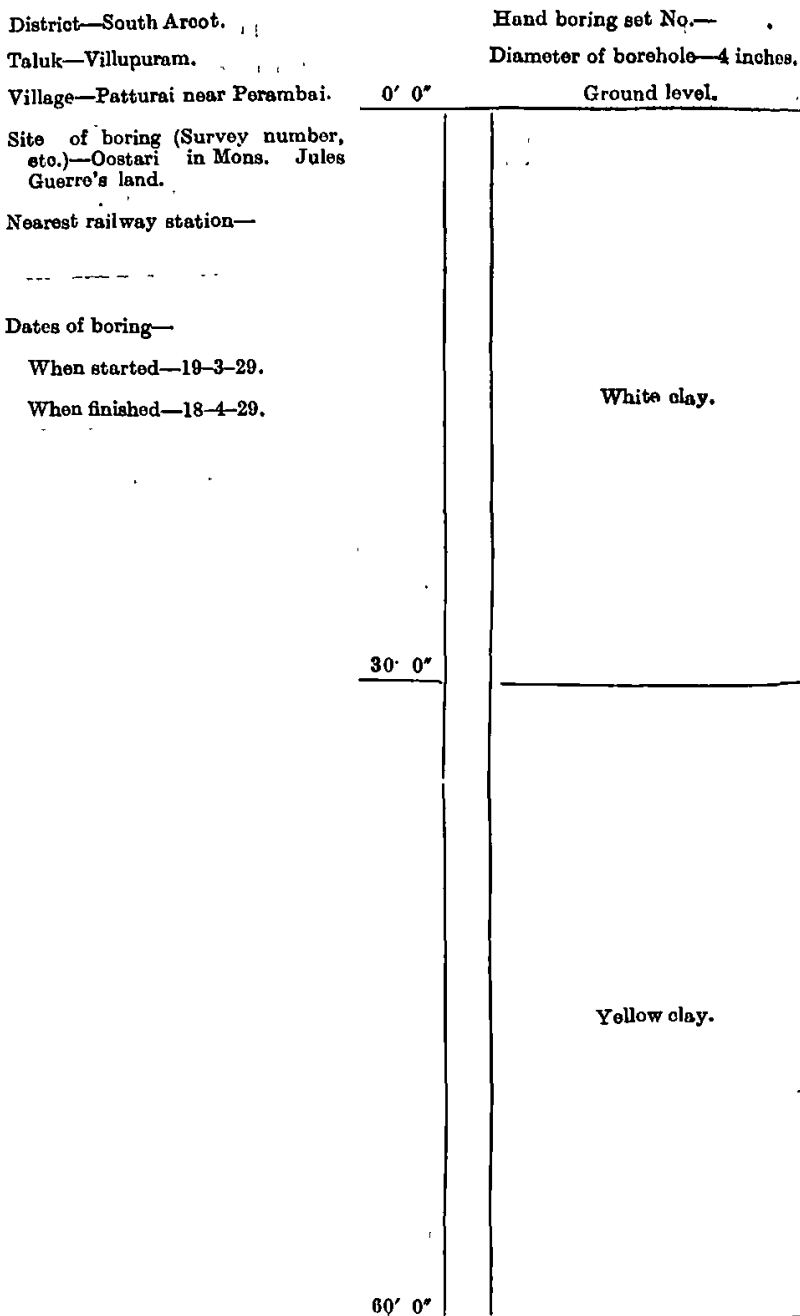
50' 0"

Hard red, white and yellow clay mixed.

CERAMIC SURVEY

. 1930-1933.

SKETCH OF BOREHOLE PUT DOWN.



CERAMIC SURVEY.

1930-1933.

SKETCH OF BOREHOLE PUT DOWN.

District—South Arcot.		Handboring set No.—	.
Taluk—Cuddalore.		Diameter of borehole—	
Village—	0' 0"	Ground level.	
Site of boring (Survey number, etc.)—Copper quarry near jail Pumping Station.			
Nearst railway station—			Sand.
Dates of boring—	16' 0"		
When started—	22' 0"		Yellow clay.
When finished—	29' 0"		White plastic clay with sand.
	38' 0"		Red clay with sand.
	40' 0"		Sand.
			Hard red purple clay.
	54' 0"		
	56' 0"		White plastic clay without any grit.
	66' 0"		White plastic clay mixed up with particles of quartz sand.
	71' 0"		Sandy clay of reddish purple.
			White plastic clay.
	86' 0"		
			White plastic clay with little grit changing to reddish colour
	100' 0"		

CERAMIC SURVEY.

1930-1933.

SKETCH OF BOREHOLE PUT DOWN.

District—South Arcot.	Hand-boring set No.—	
Taluk—Vriddhaachalam.	Diameter of borehole—	
Village—	0' 0" Ground level.	
Site of boring (Survey number, etc.)—Aziznagar Settlement.	Sand—hard clay. Loose clay—Limestone. White clay, etc.	
Nearest railway station—		
Dates of boring—		
When started—		
When finished—		
42' 0"		
65' 0"		White clay and gravel.
80' 0"		White clay and sand.
83' 0"		Hard white clay.
86' 0"		White clay with fine sand.
96' 0"	Hard white clay.	
103' 0"	White and yellow clay mixed.	
106' 0"	White clay.	
112' 0"	Hard white clay.	
116' 0"	Hard white clay mixed up with yellow-coloured clay.	
118' 0"	Hard white clay.	
125' 0"	Hard white clay with yellow clay.	

CERAMIC SURVEY.

1930-1933.

SKETCH OF BOREHOLE PUT DOWN.

District—North Arcot.

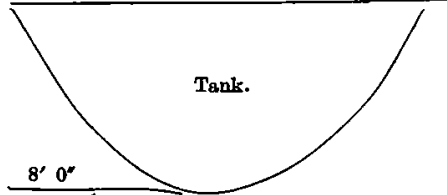
Hand-boring set No.—17.

Taluk—Cheyyar.

Diameter of borehole— .

Village—Tirupanankadu.

0' 0" Ground level.

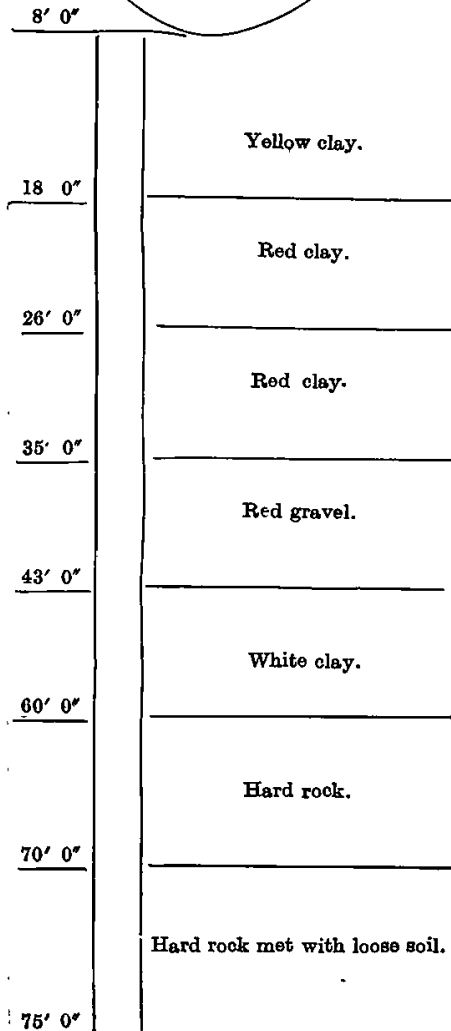
Site of boring (Survey No. etc.)—
Tank 210.

Nearest railway station—

Dates of boring—

When started—10-6-27.

When finished—19-6-27.



CERAMIC SURVEY.

1930-1933.

SKETCH OF BOREHOLE PUT DOWN.

District—North Arcot.

Hand boring set—No. 46.

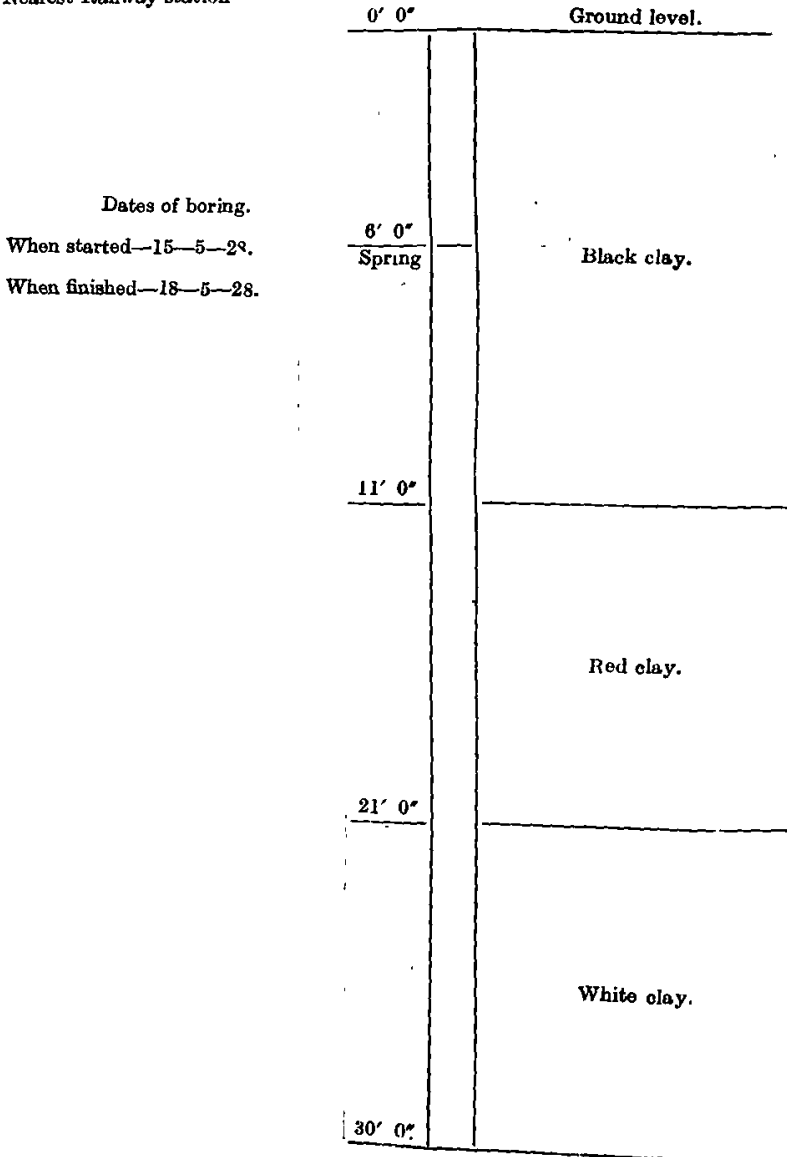
Taluk—Arkonam.

Diameter of borehole—

Village—Pallur.

Site of boring (Survey No. etc.)—118.

Nearest Railway station—



CERAMIC SURVEY.

1930-1933.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.	0' 0"	Hand boring set No. 77.
Taluk—Saidapet.		Diameter of borehole—0'-4"
Village—Ambattur.	0' 0"	Ground level.
Site of boring—(Survey number, etc.)—583/2/V.	3' 0"	Loose Red sand.
	7' 0"	Red gravel with clay.
Nearest railway station—Ambattur.	12' 0"	Yellow and Red-coloured clay.
	15' 0"	Yellow and Ash-coloured clay.
Dates of boring—	17' 0"	Yellow and Ash-coloured clay with sand.
	19' 0"	Yellow and Ash-coloured clay.
When started—19-12-32.	22' 0"	Yellow and Ash-coloured clay with Red sand.
When finished—24-12-32.	23' 6"	Red and Yellow sand with slight Ash-coloured clay.
	25' 0"	Red sand with Ash-coloured clay.
	26' 6"	Yellow and slate-coloured clay.
		Yellow-coloured clay with sand.
	33' 0"	
	36' 0"	Yellow-coloured clay with sand.
	37' 6"	Red and Ash-coloured clay with sand.
	39' 9"	Yellow and Ash-coloured clay with sand.
	"	Yellow hard clay with Sand.
	41' 10"	
	43' 0"	Red and Ash-coloured hard clay with sand.
	45' 0"	Yellow hard clay with sand.
	46' 8"	Yellow and Ash-coloured sand with clay.
	48' 0"	Yellow hard clay with clay and sand.
	50' 6"	Yellow hard clay with sand.

CERAMIC SUBVEY.

1930-1933.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput. Taluk—Saidapet. Village—Ambattur.		Hand boring set No. 77. Diameter of borehole—0'-4". Ground level.
	0' 0"	
Site of boring—(Survey number, etc.)—594.	3' 6"	Loose yellow sand.
Nearest railway station—Ambattur.	11' 0"	Red gravel with clay.
Dates of boring— When started—30-12-32. When finished—3-1-33.	14' 0"	Yellow and slight Ash-coloured clay with little percentage of gravel.
	18' 0"	Yellow and slate-coloured clay.
	22' 0"	Ash and slight yellow coloured clay.
	24' 0"	White-coloured clay.
	25' 0"	Yellow and Ash-coloured clay with fine sand.
	25' 6"	Red and yellow clay with sand.
	27' 0"	White and yellow-coloured clay mixed with sand.
	29' 0"	Yellow sand mixed with a very little percentage of Ash-coloured clay.
	30' 6"	Yellow, red and Ash-coloured sand with little clay.
	38' 6"	Slate-coloured hard sand mixed with little clay.
	40' 0"	Red sand mixed with clay.
	42' 0"	White hard sand mixed with yellow clay.
	44' 3"	Yellow hard sand with little Ash-coloured clay.
	47' 6"	Yellow and Ash-coloured clay mixed with little percentage of gravel.
	48' 0"	White clay.
	50' 0"	Ash-coloured clay mixed with yellow sand and red gravel.
	51' 0"	Ash-coloured clay mixed with fine yellow sand.
	52' 7"	Slight Ash-coloured clay mixed with yellow big sand.

CERAMIC SURVEY.

1930-1933.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

Taluk—Saidapet.

Village—Tiramullavayal.

Site of boring—East of Pachayaman Koil compound.

Hand boring set No. 77.

Diameter of borehole—0'-4".

	0' 0"	Ground level.
Survey number, etc.—282/2.	2' 6"	Red gravel mixed with clay.
Nearest railway station—Ambatur.	3' 8"	Red gravel mixed with slight ash and yellow-coloured clay.
Dates of boring—	4' 10"	Ash with slight yellow-coloured clay with little gravel.
When started—6-1-33.	6' 4"	Ash with yellow-coloured clay touched with red gravel.
When finished—10-1-33.	9' 3"	Ash and yellow-coloured clay with little gravel.
	12' 6"	Yellow-coloured clay mixed with little gravel.
	18' 8"	Blue mixed with yellow-coloured clay.
	25' 6"	Blue and yellow-coloured light loose clay mixed with dark and light loose gravel.
	42' 0"	Blue and yellow-coloured clay mixed with dark red-coloured gravel.
	43' 2"	Yellow and ash-coloured clay.
	44' 4"	Ash and yellow-coloured clay mixed with dark red gravel.
	45' 7"	Ash-coloured clay mixed with yellow sand.
	46' 1"	Dark red clay mixed with gravel.
	48' 0"	Yellow sand mixed with little percentage of yellow clay.
	48' 9"	Ash and yellow-coloured clay.
	51' 3"	Yellow sand mixed with little percentage of clay.

CERAMIC SURVEY.

1930-1933.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.		Hand boring set No. 77.
Taluk—Tiruvallur.		Diameter of borehole—0'-4"
Village—Adikattur Kandigai.	0' 0"	Ground level.
Site of boring—	0' 6"	Yellow loose dust.
Survey number, etc.—119/A-1.	2' 6"	Yellow clay touched with ash-coloured clay.
Nearest railway station—Kadambattur.	4' 6"	Ash-coloured clay mixed with yellow clay.
	5' 3"	Yellow big sand with little percentage of yellow clay.
Dates of boring—	6' 3"	Ash-coloured clay touched with yellow clay.
When started—9-2-33.		
When finished—14-2-33.		Yellow sand mixed with yellow clay.
	13' 3"	
	13' 9"	Ash-coloured clay with yellow clay.
	15' 0"	Yellow sand mixed with yellow clay.
	15' 3"	Ash-coloured clay.
	15' 9"	Yellow clay with yellow sand.
	16' 3"	Ash-coloured clay with yellow sand.
	16' 9"	Yellow and ash clay and yellow fine sand.
	19' 3"	Ash-coloured clay with yellow sand.
	22' 0"	Yellow clay touched with slight ash-coloured clay.
	24' 0"	Ash-coloured clay touched with slight yellow-coloured clay.
	27' 0"	Yellow-coloured clay mixed with ash-coloured clay.
	W.L.	
		Hard rock with yellow sand with a very little percentage of yellow clay.
	46' 0"	
	47' 0"	Yellow clay and sand mixed with mica-coloured clay.
	51' 0"	Yellow clay and sand mixed with mica-coloured hard clay.

CERAMIC SURVEY.

1930-1938.

SECTION OF BOREHOLE PUT DOWN.

District—Chingleput.

Taluk—Tiruvallur.

Village—Kilacheri.

Hand boring set No.—77.

Diameter of borehole—0' 4"

Ground level.

Site of boring—

Survey number, etc.—55-B.

Nearest railway station—Kadam-
battur.

Dates of boring—

When started—4-3-33.

When finished—8-3-33.

0	0"	
2'	6"	Yellow clay with gravel.
7'	6"	Light yellow and ash-coloured clay.
8'	6"	Yellow and ash-coloured clay.
9'	6"	Yellow and ash-coloured clay with fine sand.
10'	10"	Yellow and ash-coloured clay.
11'	9"	Loos, yellow clay with ash-coloured clay.
12'	11"	Yellow hard clay with ash-coloured clay.
13'	9"	Yellow clay with fine sand.
14'	3"	Yellow clay, fine sand and ash-coloured clay.
14'	9"	Yellow hard clay with ash-coloured clay.
15'	8"	Ash-coloured clay, yellow clay and sand.
16'	0"	White and yellow clay.
24'	0"	Ash-coloured clay with yellow clay and red gravel like clay
24'	6"	Ash-coloured clay, yellow clay and sand.
26'	0"	Ash-coloured clay with yellow clay and fine sand.
27'	3"	Ash-coloured clay with yellow clay and red gravel.
29'	6"	Ash-coloured clay with red gravel.
30'	0"	Slate-coloured clay with yellow clay and fine sand.
36'	3"	Slate-coloured clay with yellow clay and dark red gravel.
38'	4"	Slate-coloured clay with yellow clay and red gravel.
40'	3"	Slate-coloured clay with yellow clay and dark red gravel.
42'	0"	Slate-coloured clay with dark yellow clay.
43'	6"	Slate-coloured clay with fine yellow sand and dark red gravel.
45'	9"	Slate-coloured clay with yellow clay and red gravel like fine sand.
47'	3"	Hard rock like yellow fine sand with clay.
50'	6"	

W. L.

CERAMIC SURVEY.

1930-1933.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

Taluk—Sriperumbudur.

Village—Maduramangalam.

Site of boring—Facing south to
the Perumal Koil tank.

Survey number, etc.—470.

Nearest railway station—Kadam-
battur.

Dates of boring—

When started—19-3-33.

When finished—23-2-33.

Hand boring set—No. 77.

Diameter of borehole—0' 4".

Depth	Ground level.
0' 0"	Ground level.
3' 0"	Black clay and sand mixed with red gravel.
5' 0"	Yellow clay and fine sand and white gravel.
6' 3"	Yellow clay, sand, slate-coloured clay and white gravel.
7' 6"	Yellow clay, sand, slate-coloured clay and white gravel.
9' 6"	Slate-coloured clay with yellow clay.
11' 3"	Yellow clay, sand, slate-coloured clay and white gravel.
12' 0"	Slate-coloured clay and yellow clay.
12' 3"	Slate-coloured clay, yellow clay and sand with gravel.
13' 6"	Yellow clay, fine sand and slate-coloured clay.
15' 0"	Slate-coloured clay, yellow clay and gravel.
15' 5"	Yellow clay, sand and slate-coloured clay.
15' 11"	Slate-coloured and yellow clay.
16' 5"	Slate-coloured and yellow clay.
17' 1"	Yellow clay, sand and ash-coloured clay.
18' 3"	Light dark-coloured hard clay and slate-coloured clay.
19' 4"	Slate-coloured clay, yellow clay and fine sand.
22' 4"	Yellow clay and sand.
23' 9"	Hard yellow clay, fine sand and slate-coloured clay.
24' 6"	Hard yellow clay, sand and slate-coloured clay.
28' 6"	Hard yellow clay and fine sand.
36' 9"	Hard black clay with big sand.
38' 3"	Slate-coloured clay with yellow clay.
50' 3"	Hard yellow clay and fine sand.

CERAMIC SURVEY.

1930-1933.

SKETCH OF BOREHOLE PUT DOWN.

District—East Godavari.		Hand boring set—No. 44.
Taluk—Rajahmundry.		Diameter of borehole—0' 4".
Village—Punniashathram.		Ground level.
Site of boring (Survey number, etc.) —In the fields of Mr. Lovi Chetti Veeraswami.	0' 0"	
	5' 0"	Stones and hard gravel.
Nearest Railway station—Rajah- mundry, 7 miles.	7' 0"	Red and black hard rock.
	13' 0"	Yellow and white clay.
Dates of boring—	15' 0"	White and yellow clay.
When started—20-2-33.	23' 0"	Pure white clay.
When finished—1-3-33.	24' 0"	Red hard rock.
	25' 0"	Red and white clay.
	26' 0"	Soft rock.
	29' 0"	Red sand and clay.
	30' 0"	White and red clay.
	32' 0"	Red clay and sand.
	35' 0"	Red soft sand and clay.
	37' 0"	White and red clay.
	38' 0"	Red, white and blue clay and red sand.
	40' 0"	Red and white clay.
	41' 0"	Red sand and clay.
	42' 0"	White, blue clay and sand.
	43' 0"	White clay.
	44' 0"	Red and white clay.
	46' 0"	Red sand.

CERAMIC SURVEY.

1930-1933.

SKETCH OF BOREHOLE PUT DOWN.

District—East Godavari.

Hand-boring set—No. 44

Taluk—Rajahmundry.

Diameter of borehole—0' 4".

Village—Bommur.

Ground level.

Site of boring (Survey number, etc.)
—Bommur mitta (Government
lands).Nearest Railway station—Rajah-
mundry, 2 miles.

Dates of boring—

When started—12-2-33.

When finished—18-2-33.

0' 0"		Stones.
3' 0"		Gravel and stones.
7' 0"		Yellow and white clay mixed in the gravel.
11' 0"		White and blue clay mixed.
13' 0"		White, yellow, blue and dry hard clay mixed.
15' 0"		White and blue dry hard clay.
20' 0"		White, yellow and red dry hard clay.
23' 0"		White, yellow and red sand.
25' 0"		White and blue clay.
30' 0"		White hard clay.
31' 0"		Blue and white clay.
33' 0"		Yellow, red and white clay.
34' 0"		Ash colour and white clay.
39' 0"		Red and white clay.
41' 0"		Yellow and ash-white clay.
45' 0"		Red and ash-white clay.
47' 0"		Red sand and white clay.
50' 0"		

CERAMIC SURVEY.

1930-1933.

SKETCH OF BOREHOLE PUT DOWN.

District—West Godavari.

Hand boring set—No. 42.

Taluk—Ellore.

Diameter of borehole—0' 4".

Village—Venkatakrisnapuram
(Dwaraka Tirumalla).

0' 0"

Ground level

Site of boring (Survey number, etc.)
—Moksa lands.

Yellow clay.

Nearest Railway station—Bhimadole.

4' 0"

Yellow white and red clay.

Dates of boring—

When started—10-3-33.

When finished—16-3-33.

12' 0"

20' 0"

W.L.

Yellow and white clay.

28' 0"

Lime with sand and yellow
clay with sand.

36' 0"

Red rock.

39' 0"

CERAMIC SURVEY.

1930-1933.

SKETCH OF BOREHOLE PUT DOWN.

District—Nellore.

Hand boring set—No. 58.

Taluk—Kandukur.

Diameter of borehole—0' 4".

Village—Narasapuram hamlet of 0 0" Peddapavani.

Ground level.

Site of boring (Survey number, etc.)—339/4.—About 3 miles from Peddapavani.

3' 0"

White clay.

Nearest Railway station—Kavali.

Rose-coloured clay.

Dates of boring—

When started—10-3-33.

When finished—15-3-33.

12' 0"

Gray and brown clay.

16' 0"

25' 6"

Water Tapped.

White clay and sand.

35' 0"

Rose-coloured clay with sand.

51' 6"

CERAMIC SURVEY.

1930-1933.

SKETCH OF BOREHOLE PUT DOWN.

District—Salem.		Hand boring set—No. 55.
Taluk—Hosur.		Diameter of borehole—4 inches.
Village—Kalugundapalli.	0' 0"	Ground level.
Site of boring (Survey number, etc.) —238.	1' 6"	Red clay with jelly.
Nearest Railway station—Hosur.	2' 6"	Red clay with white and yellow clay.
Dates of boring—	4' 0"	White, brown, yellow clay and fine sand.
When started—22-3-33.	5' 0"	White, light yellow clay and sand.
When finished—25-3-33.	7' 0"	Dark ash coloured with white clay and sand.
	9' 0"	Ash coloured with white and green clay and sand.
	13' 0"	Light brown yellow white clay with very fine sand.
	16' 0"	Ash coloured clay with fine sand.
	18' 6"	White-rose coloured clay with sand.
	18' 0"	Light ash coloured clay with fine sand.
	19' 0"	Soft white rock.

ERAMIC SURVEY.

1930-1933.

SKETCH OF BOREHOLE PUT DOWN.

District—Tanjore.

Hand boring set—No. 39.

Taluk—Tanjore.

Diameter of borehole—4 inches.

Village—Vallam.

0' 0"

Ground level.

Site of boring (Survey number, etc.)
—176/1 A.

3' 0"

Red clay with gravel.

W.L.

Nearest Railway station—Tanjore.

7' 0"

Red and yellow clay with
gravel.

Dates of boring—

When started—14-12-32.

12' 0"

When finished—22-12-32.

White, red and yellow clay.

19' 0"

Yellow clay.

23' 0"

Ash colour white clay.

37' 6"

Yellow clay.

43' 0"

Ash colour white clay.

52' 3"

Yellow clay.

55' 0"

CERAMIC SURVEY.

1930-1933.

SKETCH OF BOREHOLE PUT DOWN.

District—Tinnevely. Hand boring set—No. 64.
 Taluk—Tiruchendur. Diameter of borehole—4 inches.
 Village—Kandasamipuram. Ground level.

	0' 0"	Ground level.
Site of boring (Survey number, etc.)—Nathakulam tank side 293.	1' 9"	Black clay.
	2' 0"	
Nearest railway station—Arumuganeri.	W. L.	White clay.
	7' 4"	
Dates of boring—		
When started—25-1-33.		White clay with sand.
When finished—2-2-33.	13' 6"	
	15' 6"	Kankar.
	20' 9"	Red clay.
	25' 4"	Blue clay with kankar.
		Clay with kankar.
	40' 6"	
		Rock.
	52' 4"	

CERAMIC SURVEY.

1930-1933.

SKETCH OF BOREHOLE PUT DOWN.

District—Tinnevely.

Hand boring set—No. 64.

Taluk—Tiruchendur.

Diameter of borehole—4 inches.

Village—Kandasamipuram.

Ground level.

Site of boring (Survey number, etc.)—About $\frac{1}{4}$ mile from Nathakulam 293.

Nearest railway station—Arumuganeri.

Dates of boring—

When started—15-2-33.

When finished—18-2-33.

0' 0"		
2' 6"	W. L.	Black clay.
4' 0"		
7' 6"		White clay.
13' 9"		White clay with shells.
15' 9"		Clay with sand.
18' 6"		Kankar shells.
4' 6"		Sand rock.

CERAMIC SURVEY.

1930-1933.

SKETCH OF BOREHOLE PUT DOWN.

District--Tinnevely.

Hand boring set--No. 64.

Taluk--Tiruchendur.

Diameter of borehole--4 inches.

Village--Kandasamipuram.

Ground level.

Site of boring--Near Nathakulam
tank side, about $1\frac{1}{4}$ miles.

Survey number, etc.--887.

Nearest railway station--Aru-
muganeri.

Dates of boring--

When started--3-2-33.

When finished--8-2-33.

0' 0"		Ground level.
		Black clay.
2' 6"		
3' 6"		
W. L.		White clay.
5' 4"		
		Blue clay with shells.
12' 6"		
		Kankar.
16' 6"		
		White rock powder.
19' 6"		
		Rock jelly mixed.
24' 6"		
		Rock in round.
29' 4"		

CERAMIC SURVEY.

1930-1933.

SKETCH OF BOREHOLE PUT DOWN.

District—Tinnevely.

Hand boring set—No. 64.

Taluk—Tiruchendur.

Diameter of borehole—4 inches.

Village—Kandasamipuram.

Site of boring—About 1½ miles from Nathakulam.

0' 0"
2' 6"
W. L.

Ground level.

Survey number, etc.—296.

Nearest railway station—Arumuganeri.

3' 6"

Black clay.

Dates of boring—

5' 9"

When started—9-2-33.

White clay.

When finished—14-2-33.

White clay with sand and shells.

9' 6"

Mixture of clays.

15' 6"

Shells and kankar.

22' 9"

Bluish kankar.

28' 9"

Sand rock with shells.

34' 9"

White rock.

41' 5"

CERAMIC SURVEY.

1930-1933.

SKETCH OF BOREHOLE PUT DOWN.

District—Tinnevely.

Hand boring set—No. 64.

Taluk—Tiruchendur.

Diameter of borehole—4 inches.

Village—Alanthula.

Site of boring—About 3 miles from railway station.

Survey number, etc.—836.

Nearest railway station—Tiruchendur.

Dates of boring—

When started—18-1-33.

When finished—25-1-33.

0' 0"	Ground level.
1' 6"	Black clay.
2' 5"	
-W.L.	Light yellow clay.
10' 0"	
12' 0"	White clay.
	Blue clay.
16' 0"	
18' 0"	Kankar.
	Coarse sand.
27' 6"	
	Fine sand with shell.
49' 10"	

CERAMIC SURVEY.

1930-1933.

SKETCH OF BOREHOLE PUT DOWN.

District—Tinnevely.

Hand boring set—No. 64.

Taluk—Tiruchendur.

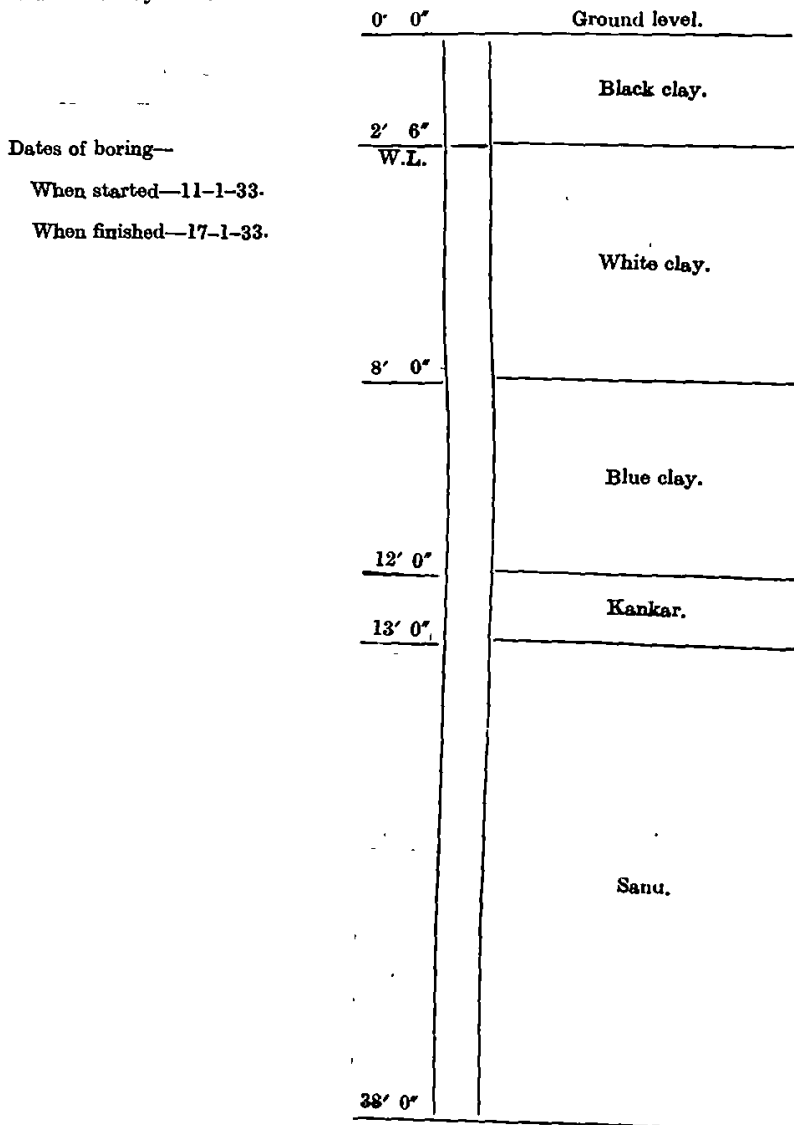
Diameter of borehole—4 inches.

Village—Vamanthurai valai.

Site of boring—About 2 miles from railway station.

Survey number, etc.—99.

Nearest railway station—Tiruchendur.



CERAMIC SURVEY.

1930-1933.

SKETCH OF BOREHOLE PUT DOWN.

District—Tinnevely.

Hand boring set—No. 64.

Taluk—Tiruchendür.

Diameter of borehole—0' 4".

Village—Vannanduraivalai.

Site of boring (Survey number, etc.)—99.

Nearest railway station—Tiruchendur.

	0' 0"	Ground level.
	1' 6"	Black clay.
Dates of boring—	W.L. 3' 0"	
When started—4-1-33.		White clay.
When finished—10-1-33.	10' 0"	
		Blue clay.
	14' 6"	
		Kankar.
	18' 6"	
		Coarse sand.
	23' 6"	
		Sand.
	28' 9"	
		Sand.
	33' 3"	

CERAMIC SURVEY.

1930-1933.

SKETCH OF BOREHOLE PUT DOWN.

District—Tinnevely.

Hand boring set—No. 64.

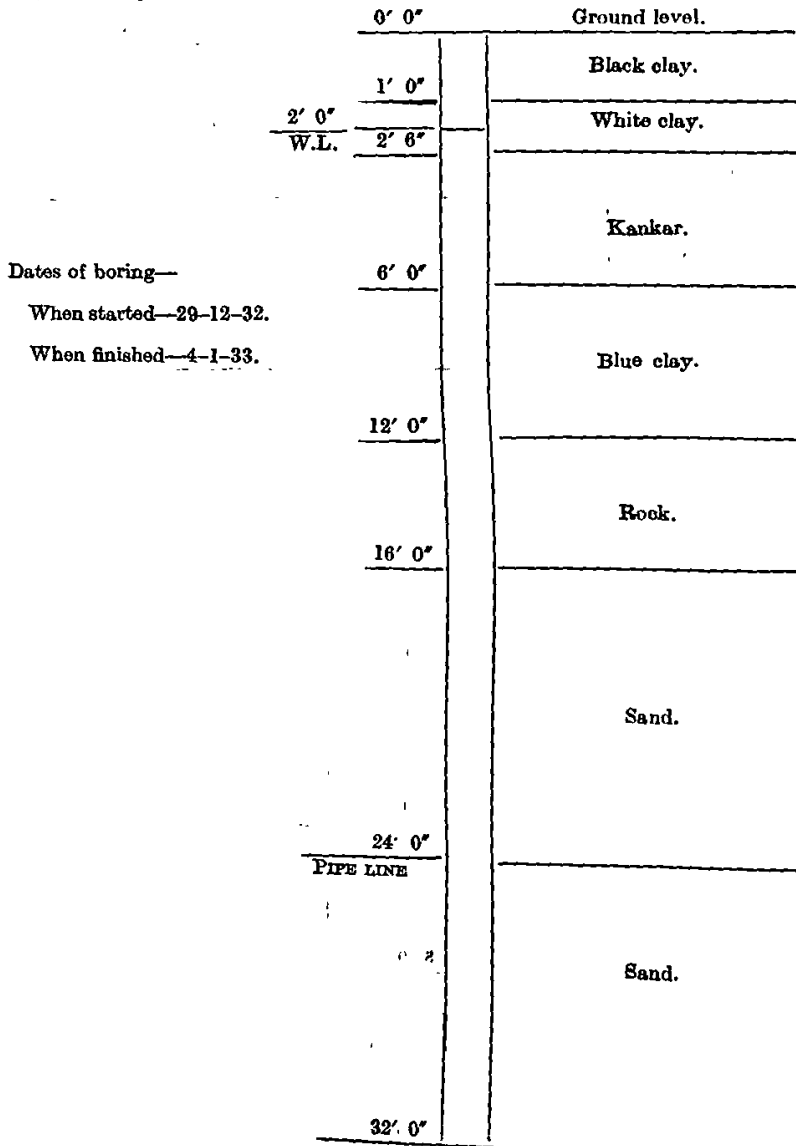
Taluk—Tiruchendur.

Diameter of borehole—0' 4".

Village—Vannanduraivalai.

Site of boring (Survey number, etc.)—99.

Nearest railway station—Tiruchendur.



CERAMIC SURVEY.

1930-1933.

SKETCH OF BOREHOLE PUT DOWN.

District—Tinnevely.

Hand boring set No. 64.

Taluk—Tenkasi.

Diameter of borehole—0' 4"

Village—Surandai.

0' 0"

Ground level.

Site of boring—About 1½ miles from Surandai on the path of Sundraparisapuram (Survey number, etc.)—1930.

Nearest railway Station—Parur Chatram.

Dates of boring—

8' 4"

When started—26-2-33.

When finished—6-3-33.

Black clay.

Ash-coloured clay.

White clay.

White rock.

Coarse sand.

15' 3"

19' 3"

24' 6"
W.L.

24' 3"

39' 9"

CERAMIC SURVEY.

1930-1933.

SKETCH OF BOREHOLE PUT DOWN.

District—Trichinopoly.

Hand boring set No.

Taluk—Perambalur.

Diameter of borehole—

Village—Karai.

0' 0"

Ground level.

Site of boring (Survey number,
etc.)—584/1.

2' 0"

Hard black clay.

Nearest railway station—
Trichinopoly.

4' 0"

Black clay with lime.

10' 0"

Brown clay.

Dates of boring—

When started—January 1933.

10' 6"

Red clay with sand.

When finished—

12' 0"

Sukkam with many colours.

14' 0"

Sand.

14' 6"

White clay.

17' 6"

Brown clay with sand.

17' 8"

Sandy porous rock.

18' 0"

W. L.

19' 8"

Brown clay.

20' 8"

Brown clay with sand.

21' 8"

White clay.

23' 8"

Reddish brown clay.

25' 8"

Brown coarse sand.

26' 8"

White clay with several colours.

28' 8"

Coarse sand.

35' 0"

Sand.

APPENDIX D.

Borings put down by the Department for private parties before
the Ceramic Survey.

CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Anantapur.

Taluk—Gooty.

Village—Thimmancherla.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the Party—Vasudeva Sastry.

0' 0"	Ground level.
5' 0"	White clay.
8' 0"	Hard clay and stone.
15' 0"	Hard white clay mixed with stone.
20' 0"	Soft stone.
23' 0"	Soft stone.
25' 0"	Hard red clay.

CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Anantapur.

Taluk—Gooty.

Village—Thimmancherla.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the Party—Meeravanjee Maneckji.

0' 0"	Ground level.
	White clay.
8' 0"	
	Soft stone with white clay.
15' 0"	
	Soft stone with white clay.
20' 0"	
	White clay.
22' 0"	
	Soft light green stone.
35' 0"	

CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Anantapur.

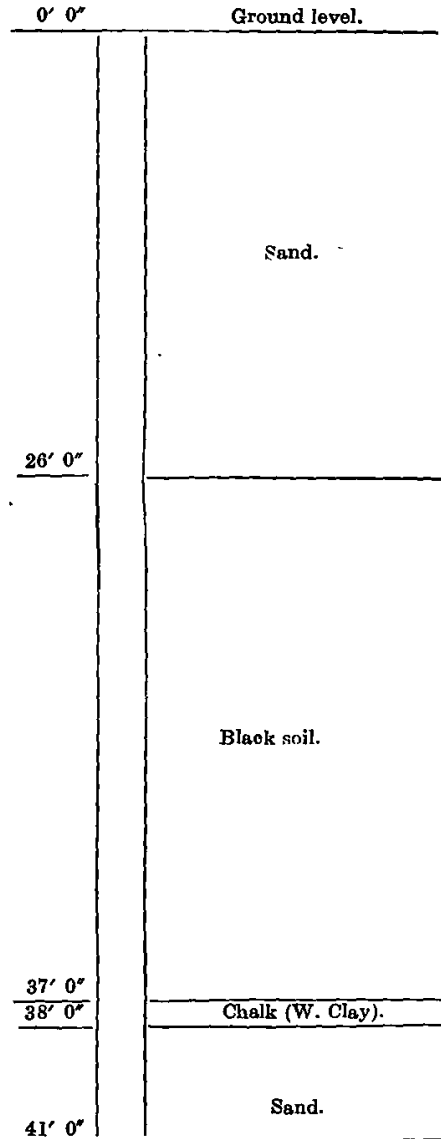
Taluk—Gooty.

Village—Kasapalli.

Site of boring (survey number, etc.)—House-site.

Nearest railway station—

Name of the Party—B. Ranga Reddi.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Anantapur.

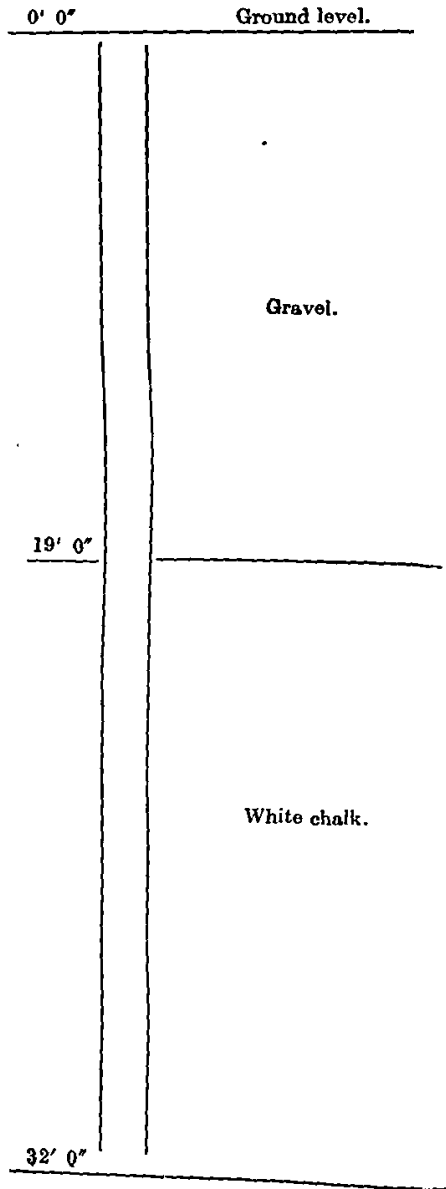
Taluk—Gooty.

Village—Gooty.

Site of boring (survey number, etc.)—1684.

Nearest railway station—

Name of the Party—Y. Rasul Sahib.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Anantapur.

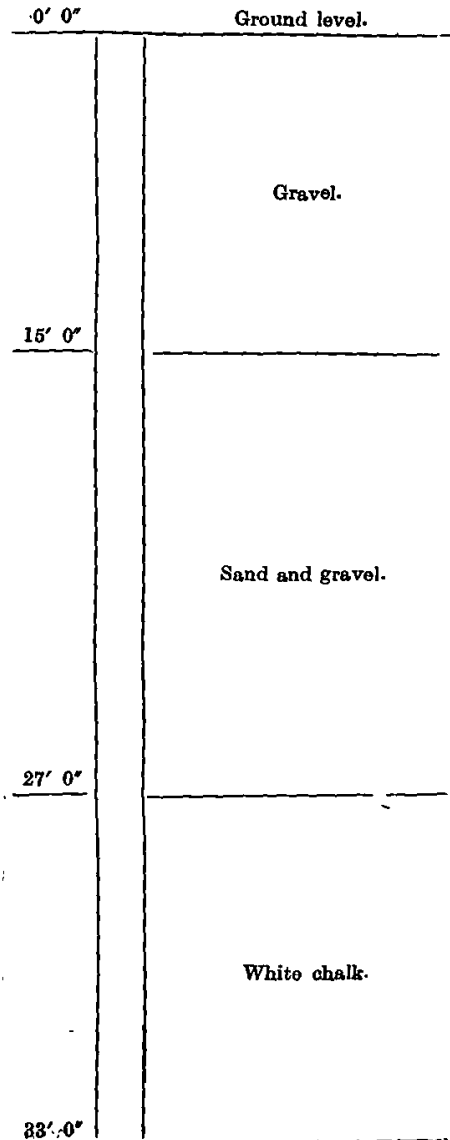
Taluk—Gooty.

Village—Gooty.

Site of boring (survey number, etc.)—1684.

Nearest railway station—

Name of the party—Y. Rasul Sahib.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Anantapur.

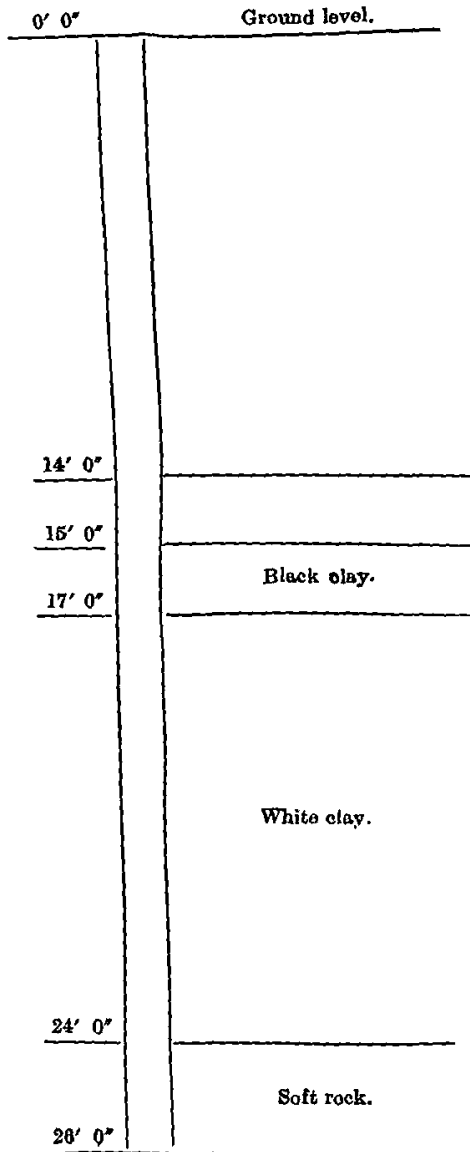
Taluk—Kalyandrug.

Village—Appilipalli.

Site of boring—(survey number, etc.)—

Nearest railway station—

Name of the party—Venkataramana Rao.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Bellary.

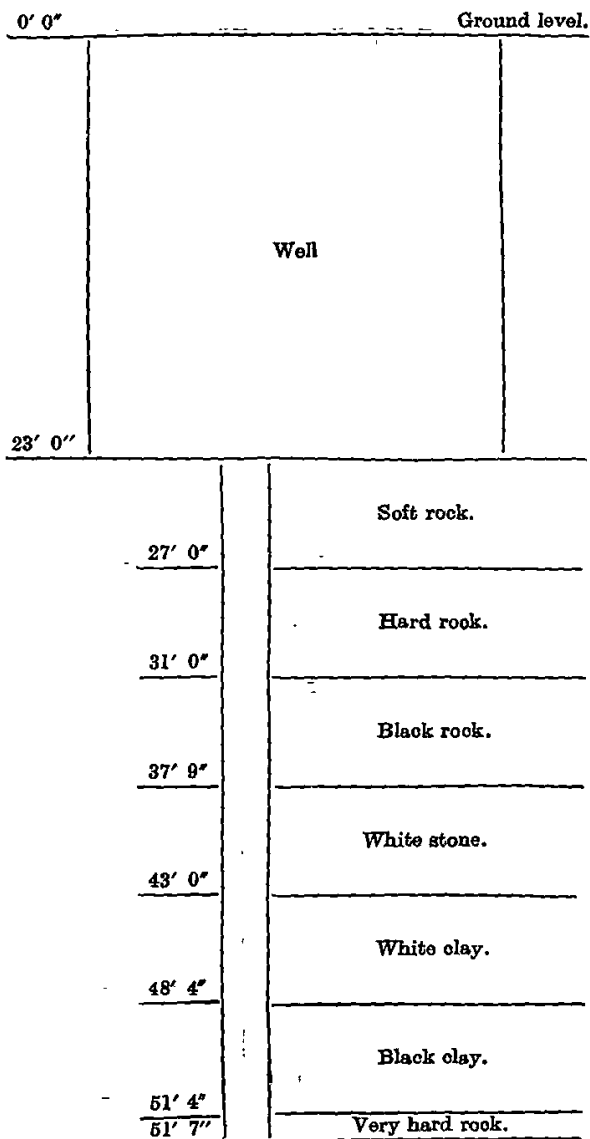
Taluk—Alur.

Village—Bantanhal.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—Bantanhal Farm Manager.



CERAMIC SURVEY.

SKETCH OF BORSHOLE PUT DOWN.

District—Bellary.

Taluk—Bellary.

Village—Hagari.

Site of boring (survey number, etc.)—

Nearest railway station—Hagari.

Name of the party—Government Farm Manager, Hagari.

0' 0"	Ground level.
Well.	
20' 0"	
25' 0"	Small sands.
27' 0"	Gravel.
29' 0"	Coarse sand.
32' 0"	Hard clay.
37' 0"	Red clay.
49' 0"	White clay.
59' 0"	Soft rock.
59' 8"	Hard rock.

CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Bellary.

Taluk—Bellary.

Village—Kurugod.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—N. Mari Basavarama Gowd.

0' 0"	Ground level
	White clay.
21' 0"	
	Hard clay.
23' 0"	
	White soft rock.
66' 0"	
	Loose rock.
69' 0"	
	White hard rock.
82' 0"	
	White soft rock.
99' 6"	
	White hardest rock.
104' 6"	
	Soft rock.
105' 6"	
	Hard rock.
106' 6"	
	White hardest rock.
133' 6"	

CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

Taluk—Ponneri.

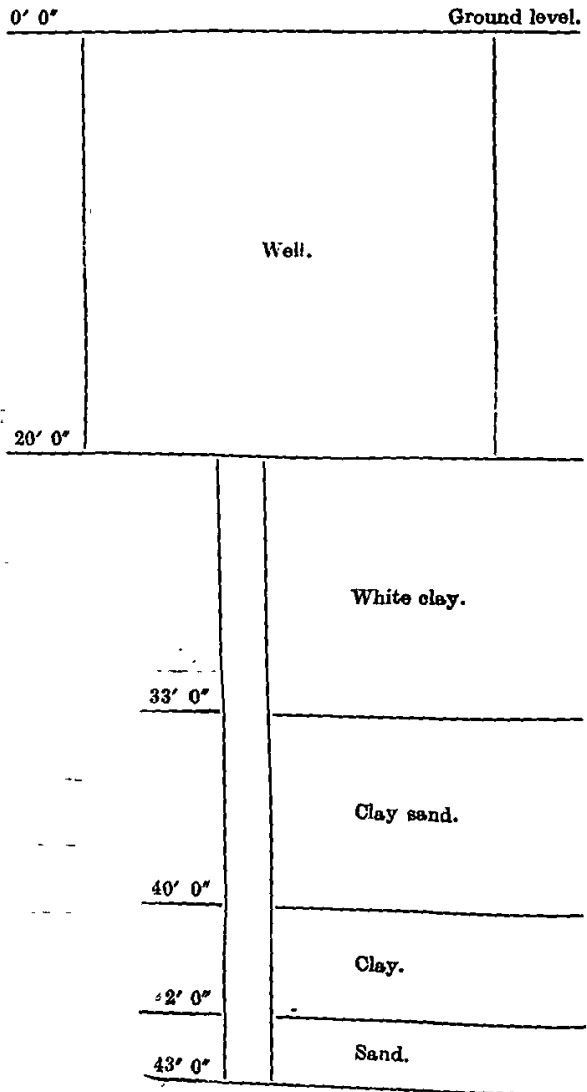
Village—Panchatti.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—Munuswami Mudaliyar.

1906-1907.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

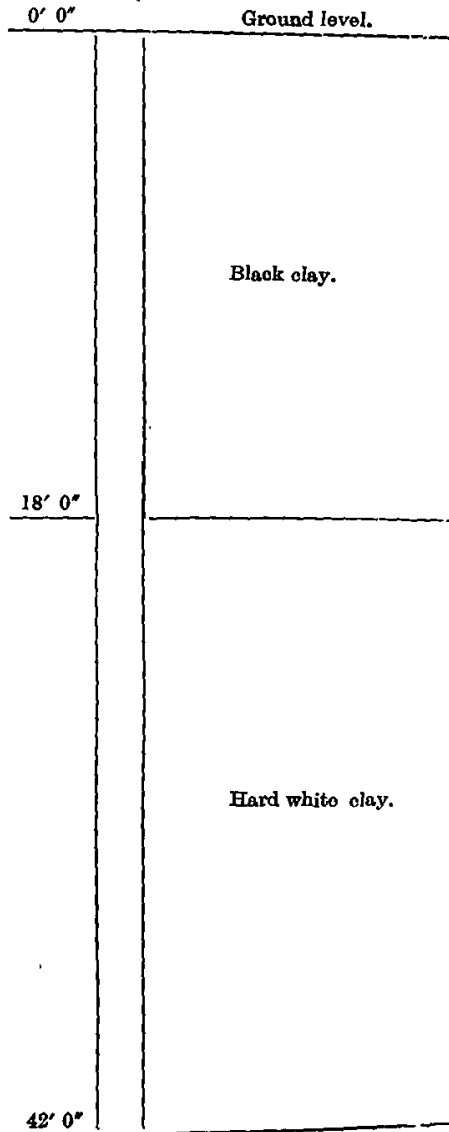
Taluk—Ponneri.

Village—Kodamanjeri.

Site of boring (survey number, etc.)—88

Nearest railway station—

Name of the party—Olinbe Reddi.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

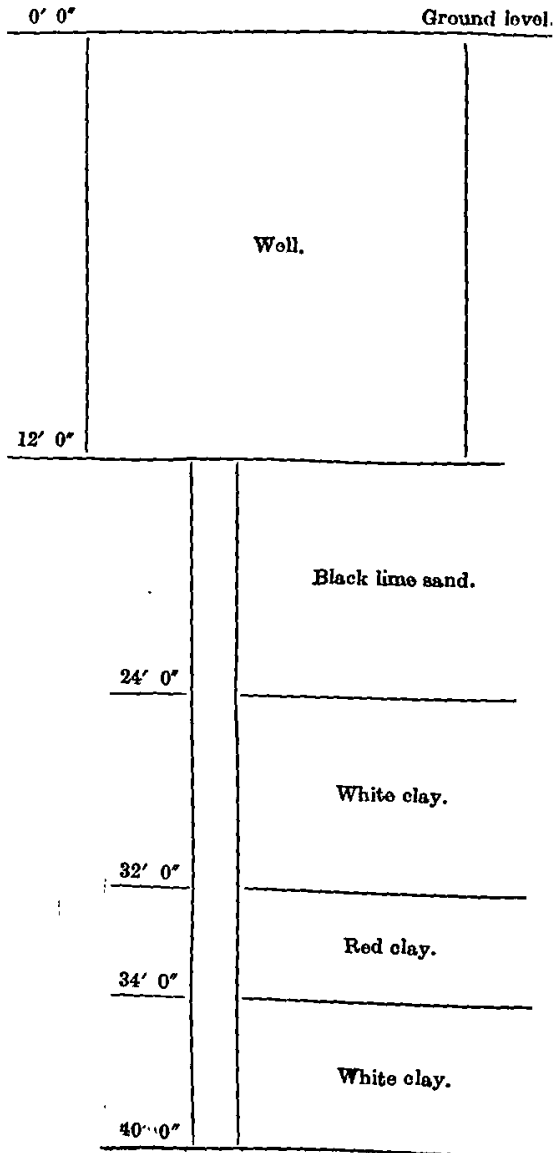
Taluk—Ponneri.

Village—Vanjerakkam.

Site of boring (survey number etc.)—166.

Nearest railway station—

Name of the party—Murugappa Mudaliyar.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

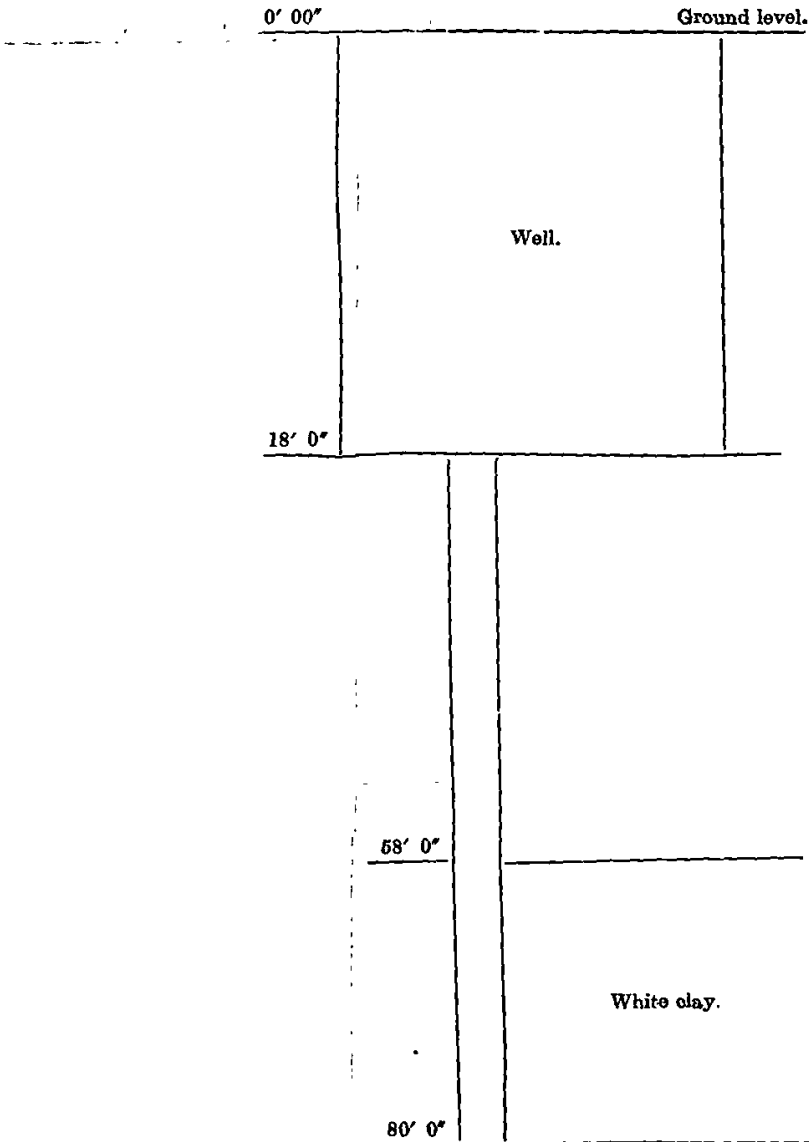
Taluk—Ponneri.

Village—Vallivoyal.

Site of boring (survey number, etc.)—Zamin.

Nearest railway station—

Name of the party—Alwaranyar.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

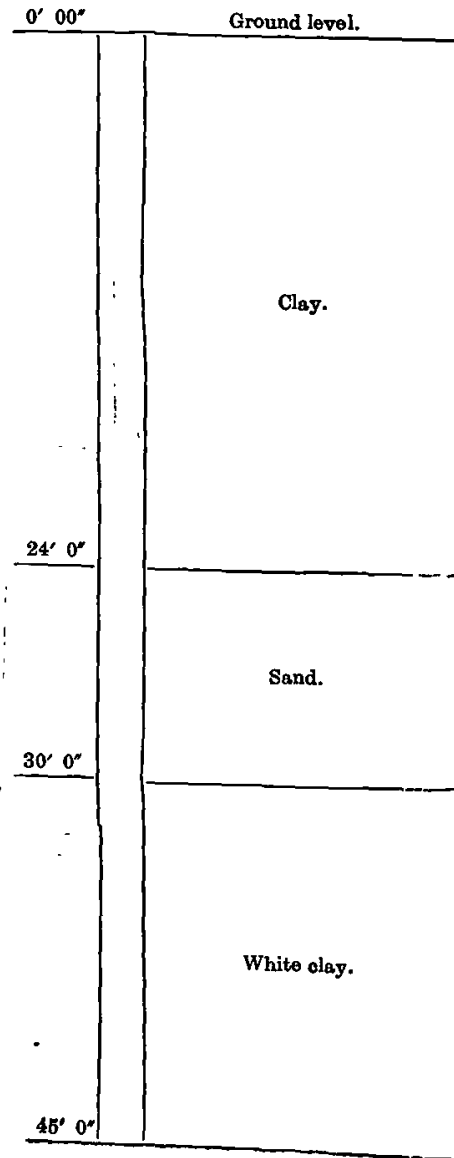
Taluk—Ponneri.

Village—Vallur.

Site of boring (survey number, etc.)—288.

Nearest railway station—

Name of the party—Mr. Arumugam.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

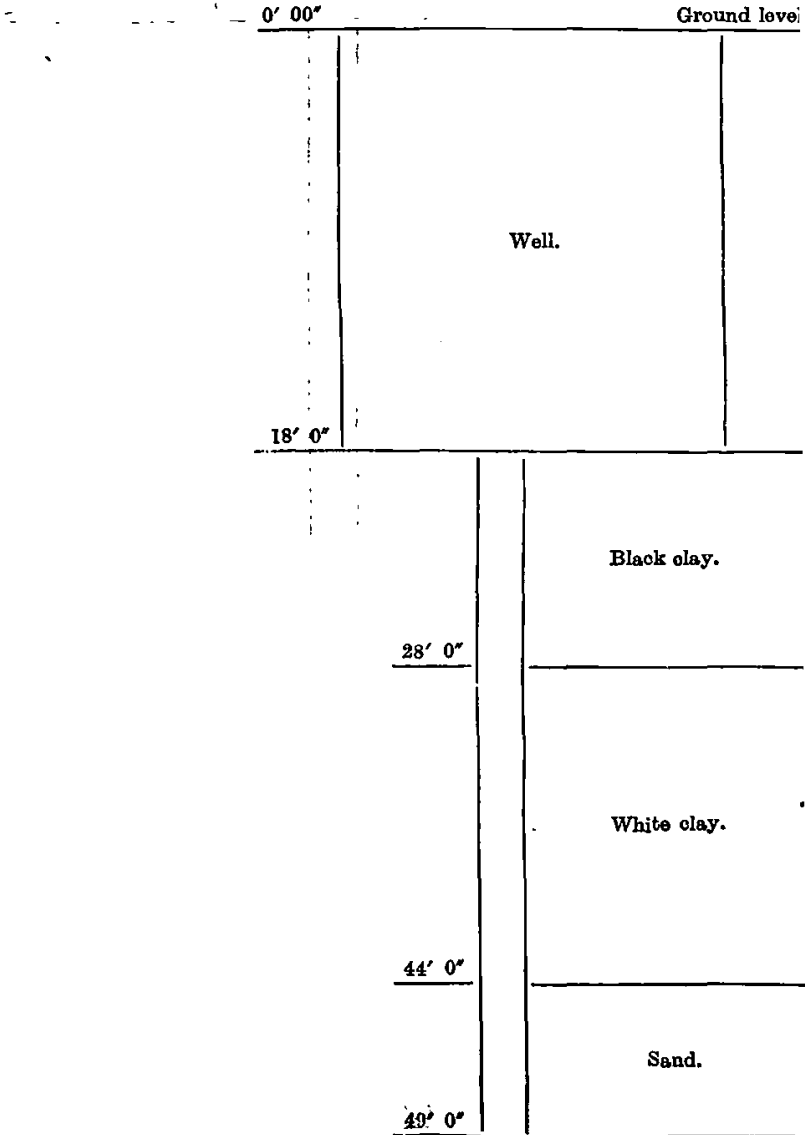
Taluk—Ponneri.

Village—Minjur.

Site of boring (survey number, etc.)—Zamin.

Nearest railway station—

Name of the party—Mr. Kasi Chettiyar.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

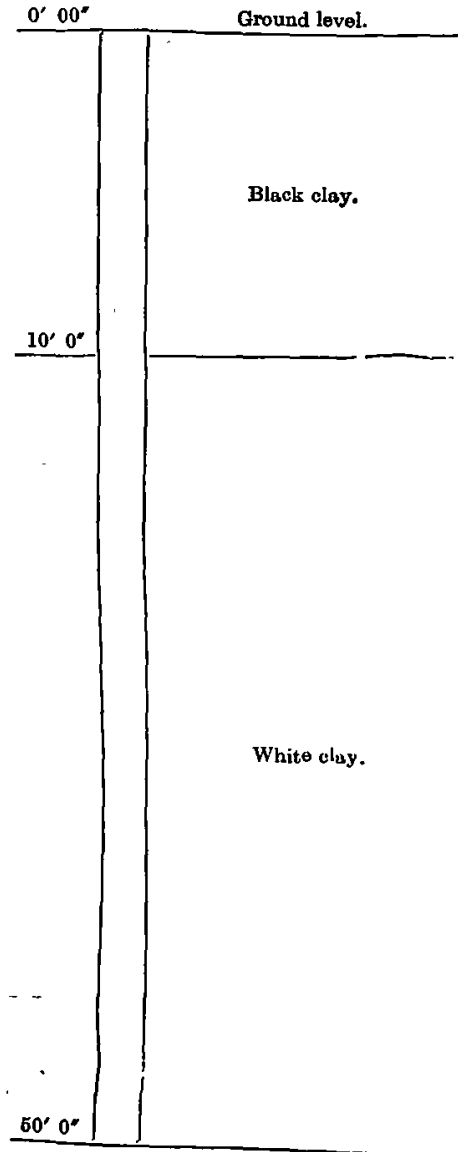
Taluk—Ponneri.

Village—Kaniampakam.

Site of boring (survey number, etc.)—174-A.

Nearest railway station—

Name of the party—Mr. Venkatakrishna Reddi.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

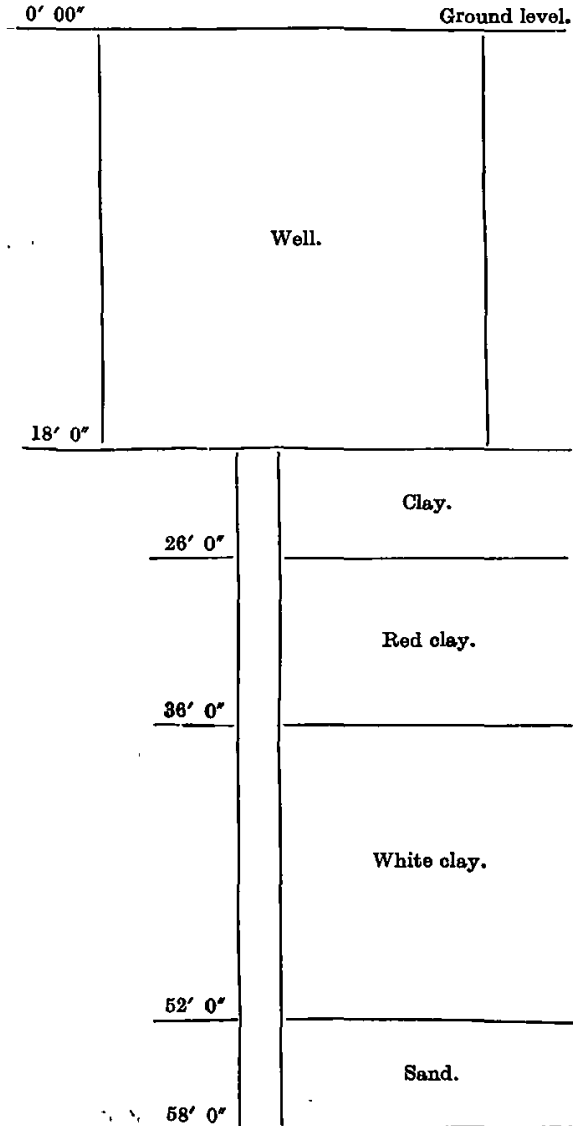
Taluk—Ponneri.

Village—Nalur.

Site of boring (survey number, etc.)—50. -

Nearest railway station—

Name of the party—Mr. Thangavelu Mudaliyar.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

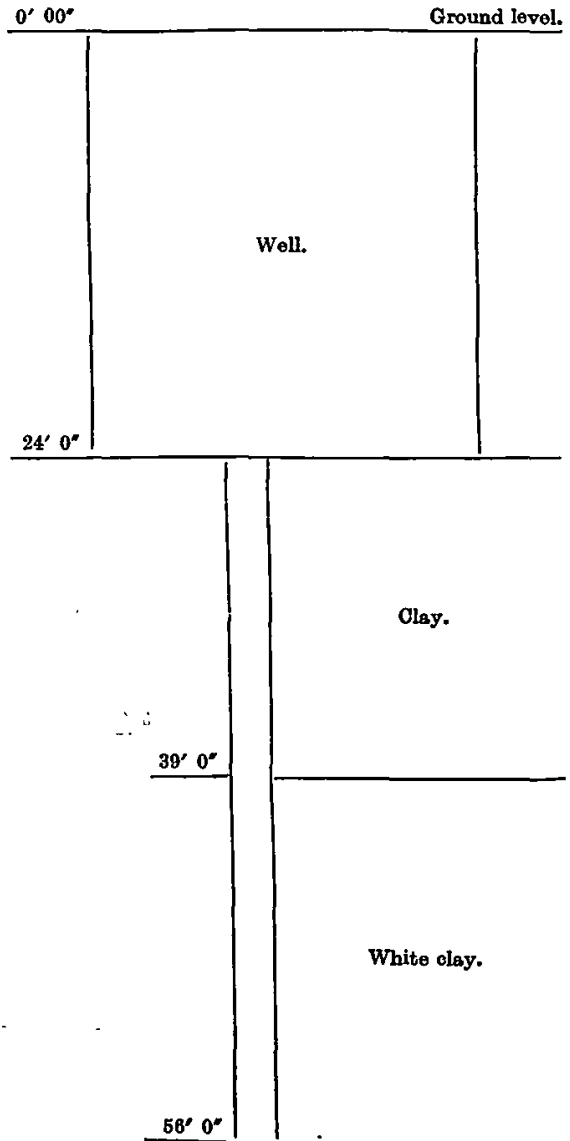
Taluk—Ponneri.

Village—Nalur.

Site of boring (survey number, etc.)—50.

Nearest railway station—

Name of the party—Mr. Raju Mudaliyar.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

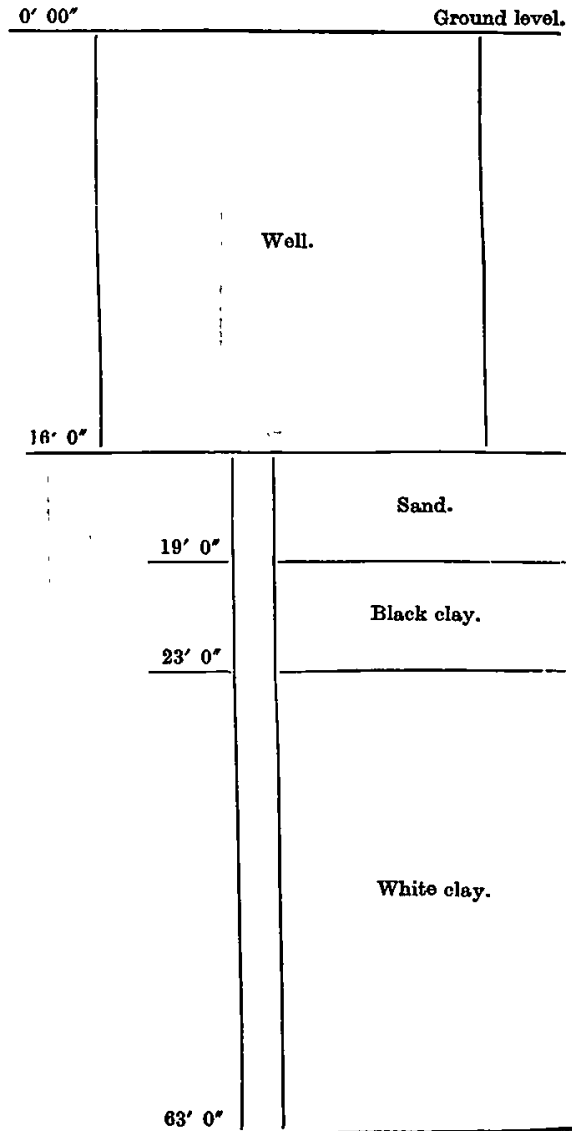
Taluk—Ponneri.

Village—Reddipalayam.

Site of boring (survey number, etc.)—Zamin.

Nearest railway station—

Name of the party—Mr. M. Subbaroya Reddi.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

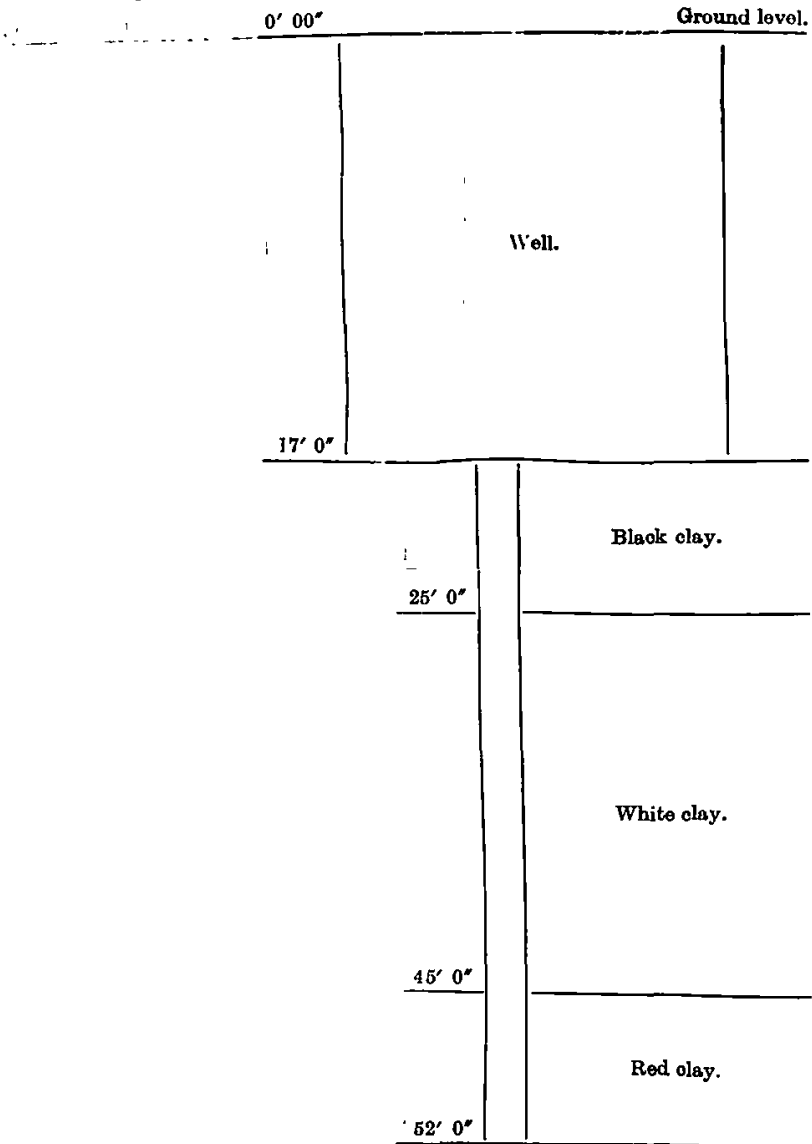
Taluk—Ponneri.

Village—Palavar.

Site of boring (survey number, etc.)—144.

Nearest railway station—

Name of the party—Mr. Vengappa Nayudu.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

Taluk—Ponneri.

Village—Uppalam.

Site of boring (survey number, etc.)—152.

Nearest railway station—

Name of the party—Mr. Madurakavi Mudaliyar.

0' 00"	Ground level.
	Clay.
6' 0"	
	Sand.
16' 0"	
18' 0"	Wet clay.
	Clay and sand.
23' 0"	
	White clay.
32' 0"	
	Mixture of clay and sand.
42' 0"	
	White clay.
54' 0"	

CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

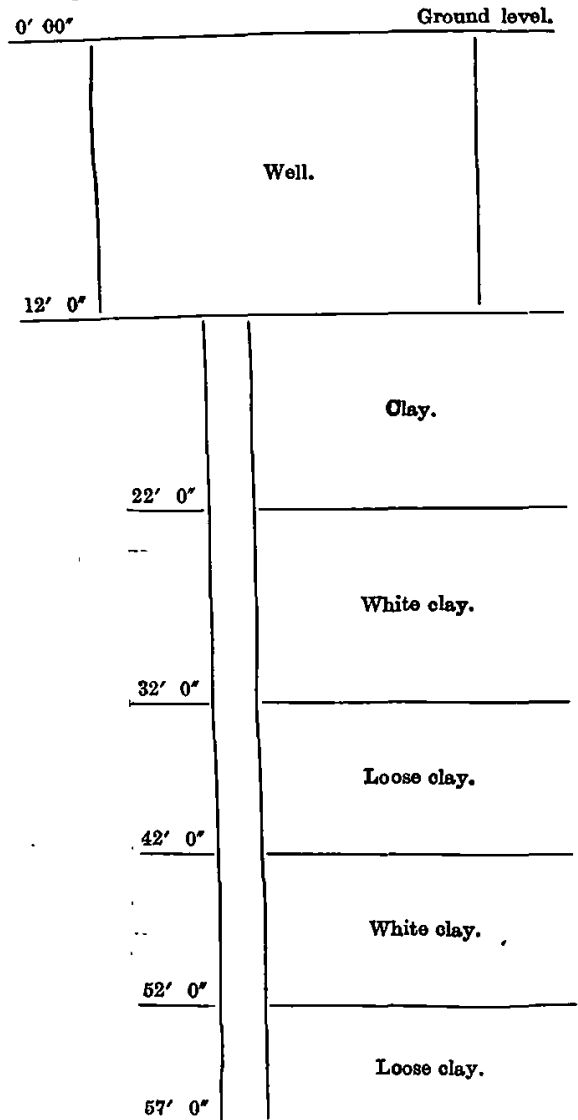
Taluk—Ponneri.

Village—Lingapunjampettai.

Site of boring (survey number, etc.)—Zamin.

Nearest railway station—

Name of the party—Mr. Mavalinga Reddi.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

Taluk—Ponneri.

Village—Eanur.

Site of boring (survey number, etc.)—173.

Nearest railway station—

Name of the party—Mr. Balasundra Mudaliyar.

0' 00"	Ground level.
10' 0"	Sand.
40' 0"	Clay.
46' 0"	Clay and sand.
56' 0"	Lime clay.
66' 0"	Clay.
91' 0"	White clay.
104' 0"	Lime clay.

CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

Taluk—Ponneri.

Village—Kadamanjeri.

Site of boring (survey number, etc.)—88.

Nearest railway station—

Name of the party—Mr. Subbaraya Reddi.

0' 00"	Ground level.
	Red clay.
12' 0"	Loose clay.
20' 0"	Clay.
25' 0"	White clay.
40' 0"	Red clay.
58' 0"	

129

CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

Taluk—Ponneri.

Village—Kodur.

Site of boring (survey number, etc.)—119.

Nearest railway station—

Name of the party—Mr. Rangappa Nayudu.

0' 00"	Ground level.
20' 0"	Well.
26' 0"	Sand.
33' 0"	White clay.
47' 0"	White clay and sand.
48' 0"	Lime sand.
51' 0"	Coarse sand.
65' 0"	Loose clay and sand.

CERAMIC SURVEY.

. SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

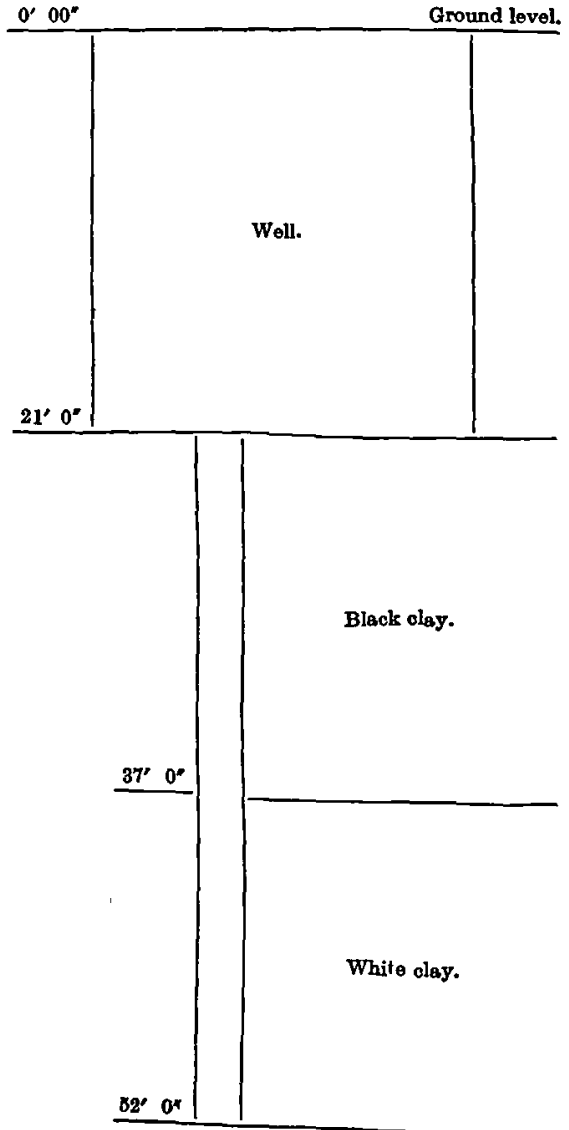
Taluk—Ponneri.

Village—Kalappakam.

Site of boring (survey number, etc.)—51.

Nearest railway station—

Name of the party—Mr. Vasantaraya.



131

CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

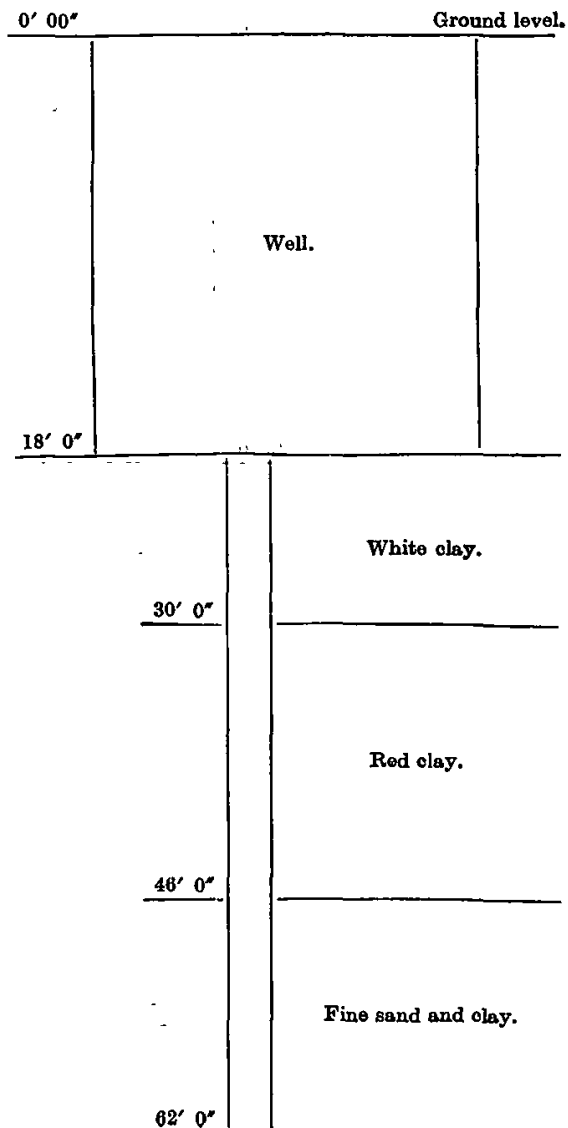
Taluk—Ponneri.

Village—Sothupakam.

Site of boring (survey number, etc.)—7.

Nearest railway station—

Name of the party—Mr. Tiruvenkataswami Nayudu.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

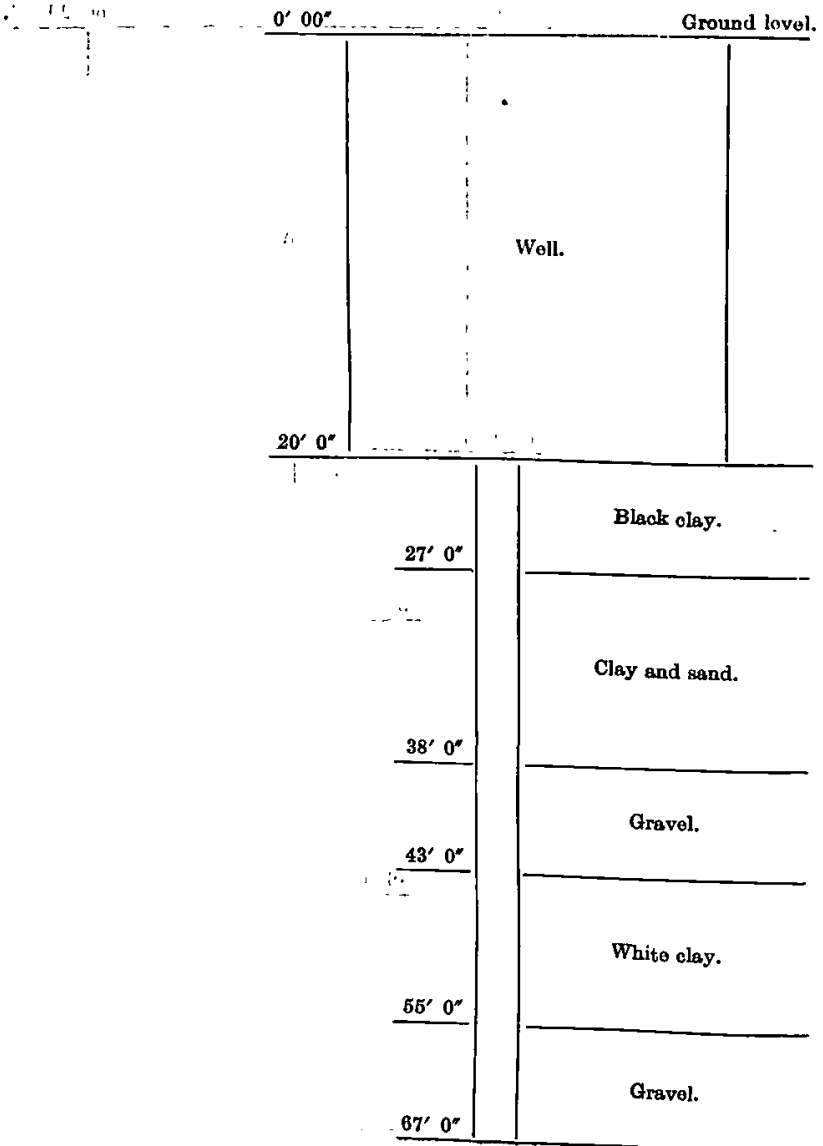
Taluk—Ponneri.

Village—Sembilivaram.

Site of boring (survey number, etc.)—183.

Nearest railway station—

Name of the party—Mr. Venkataswami Nayudu.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

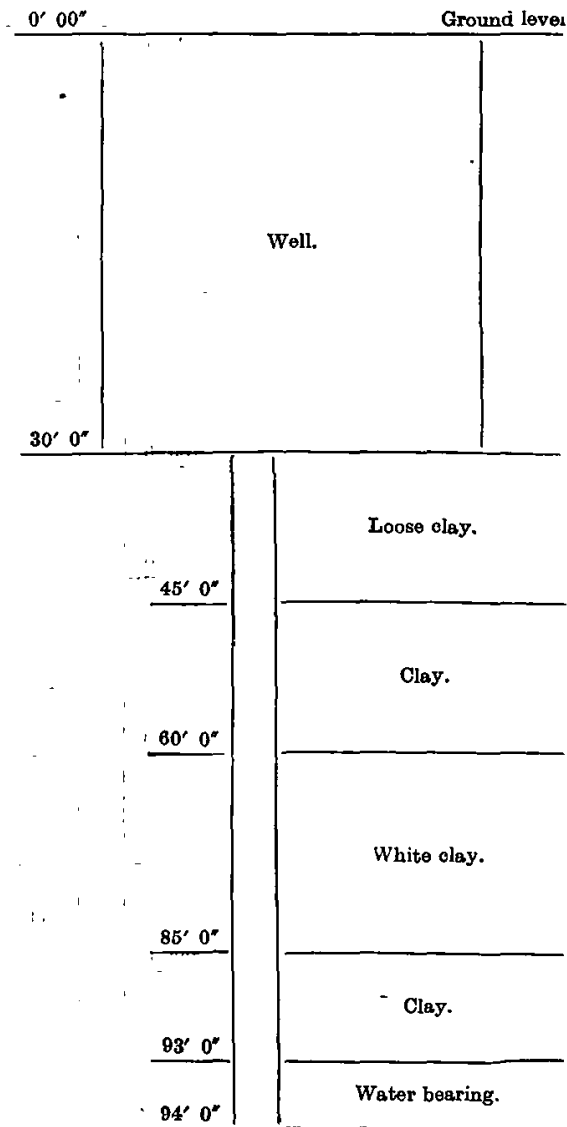
Taluk—Ponneri.

Village—Sakamangam.

Site of boring (Survey number, etc.)—Nil.

Nearest railway station—

Name of the party—Mr. Muniappa Chetti.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—South Arcot.

Taluk—Vriddhachalam.

Village—Peruvarapur.

Site of boring (Survey number, etc.)—

Nearest railway station—

Name of the party—Chandrasekaran Pillai.

0' 00"	Ground level.
11' 0"	Plastic black clay.
	Sand.
40' 0"	
45' 0"	Sukkan plastic white clay.
	White clay.
65' 0"	
	Pebbles with clay.
90' 0"	
	Sand bed.
109' 0"	
110' 0"	Red stone gravel.
	Sand.
135' 0"	
142' 0"	Hard yellow clay.
	Hard red clay.
162' 0"	
	Hard yellow clay.
180' 0"	
	White plastic clay.
218' 0"	
	White clay mixed with sand.
255' 0"	
	Black plastic clay.
299' 0"	
300' 0"	Water.

CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—South Arcot.

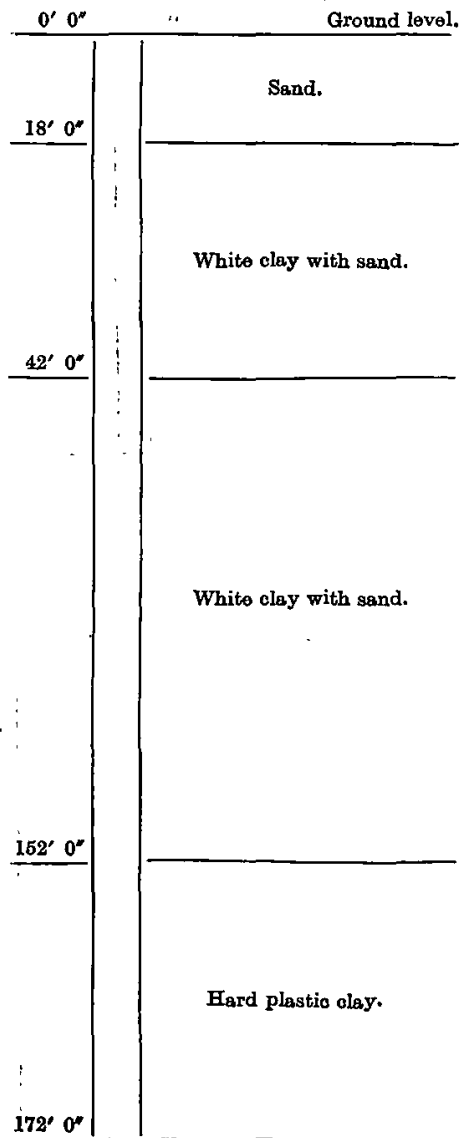
Taluk—Vriddhachalam.

Village—Thevangudi.

Site of boring (Survey number, etc.)—9 miles from Vriddhachalam Railway Station.

Nearest railway station—

Name of the party—



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

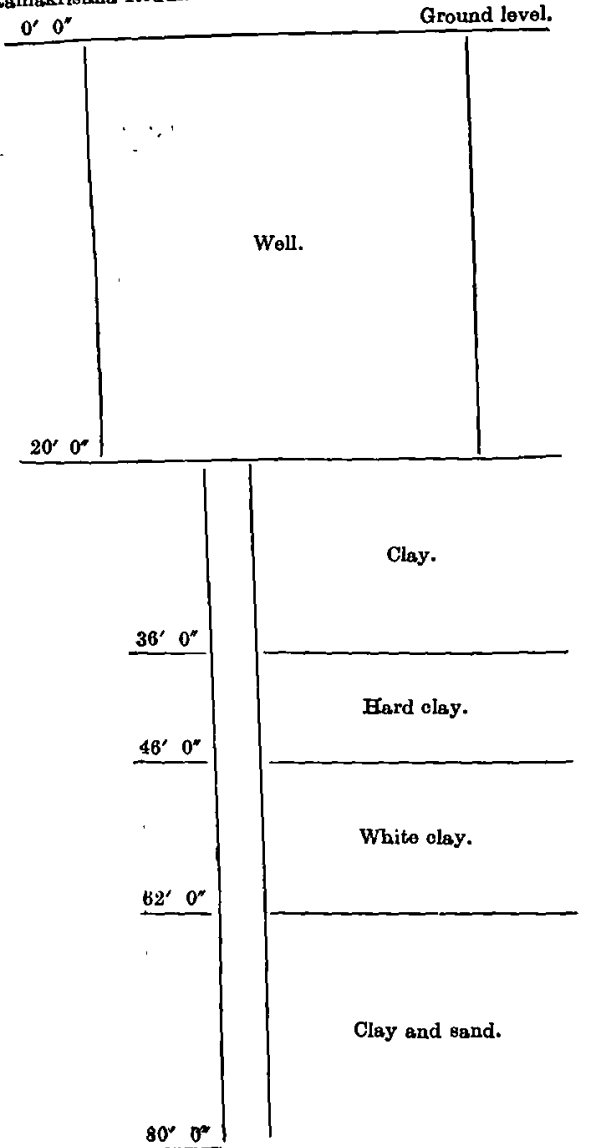
Taluk—Ponneri.

Village—Aryanvayal.

Site of boring (Survey number, etc.).

Nearest railway station—

Name of the party—Mr. Ramakrishna Reddi.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

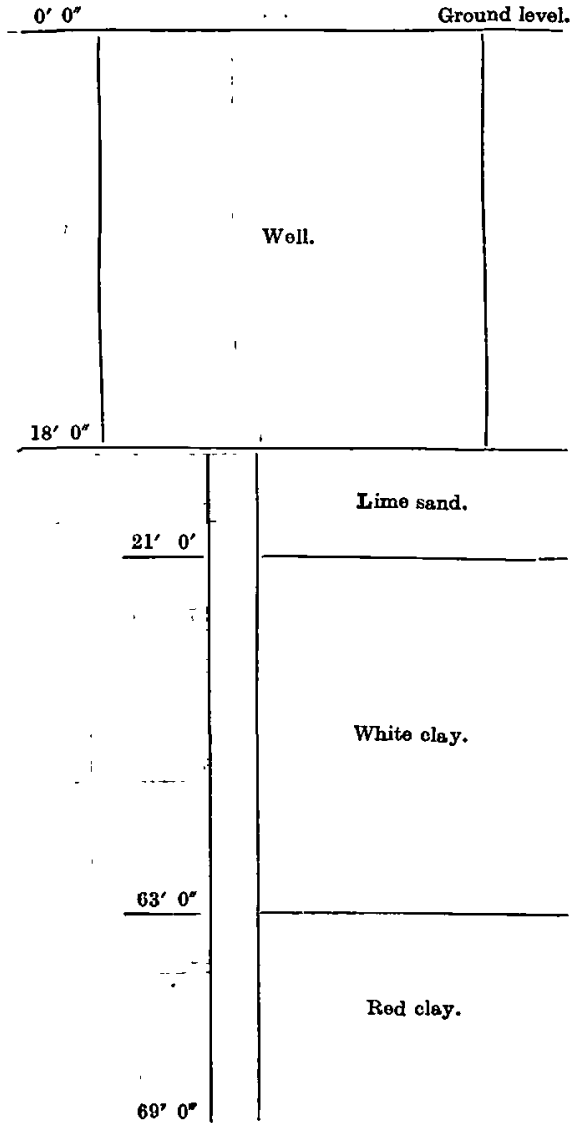
Taluk—Ponneri.

Village—Peruvoyal.

Site of boring (Survey number, etc.)—

Nearest railway station—

Name of the party—Mr. Sadayappa Mudaliyar.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

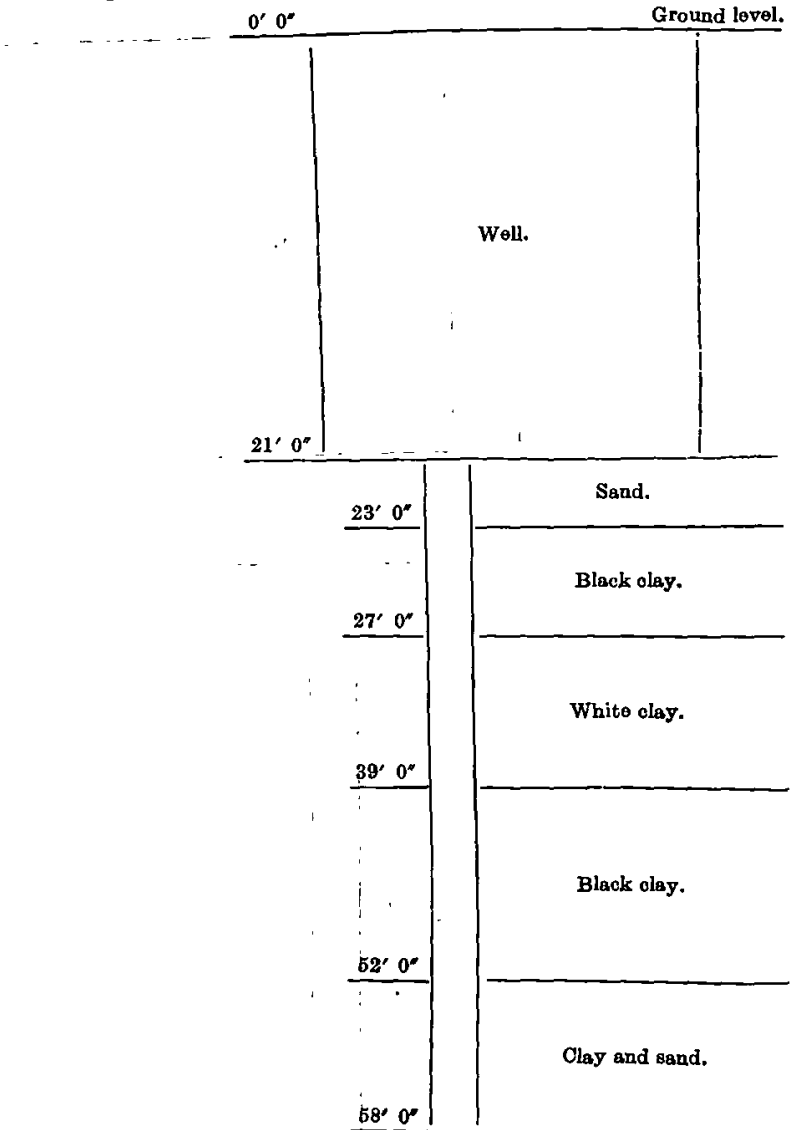
Taluk—Ponneri.

Village—Arni.

Site of boring (Survey number, etc.)—2.

Nearest railway station—

Name of the party—Mr. Subroya Chetti.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

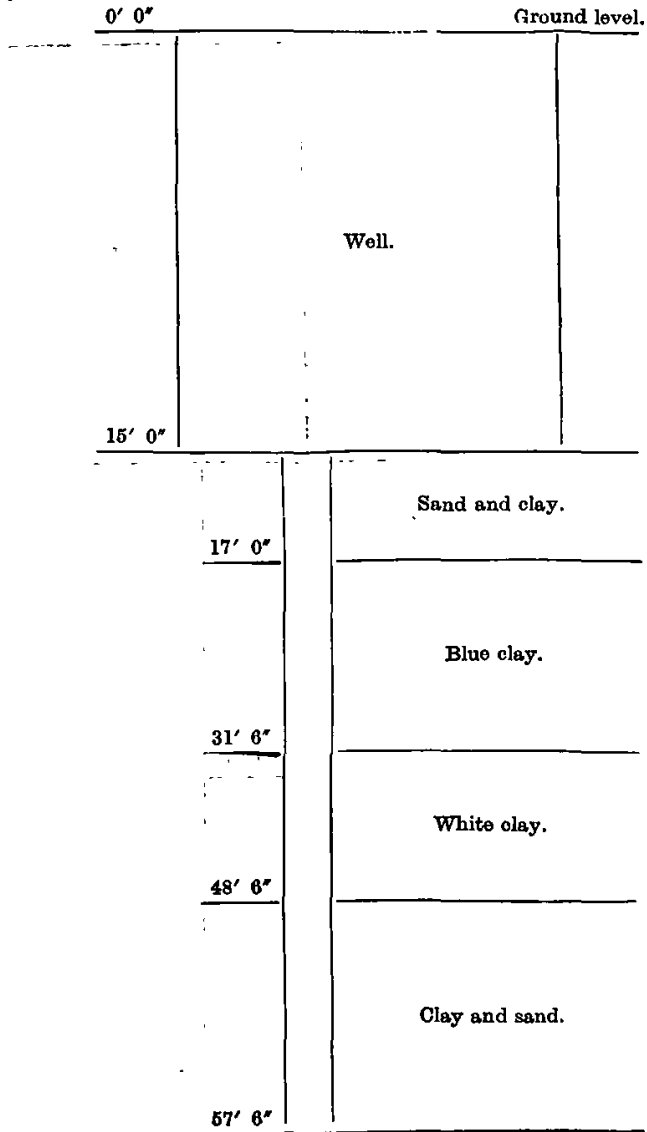
Taluk—Ponneri.

Village—Kathur.

Site of boring (Survey number, etc.)—705.

Nearest railway station—

Name of the party—Mr. Sundara Mudaliyar.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

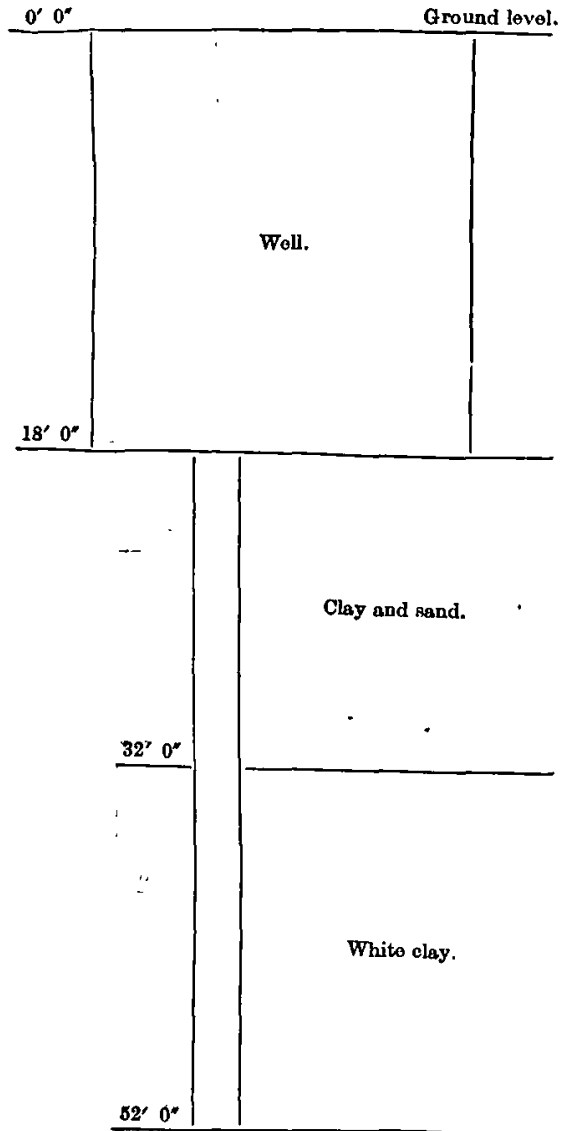
Taluk—Ponneri.

Village—Panappakam.

Site of boring (Survey number, etc.)—96.

Nearest railway station—

Name of the party—Mr. Ramaswami Mudaliyar,



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

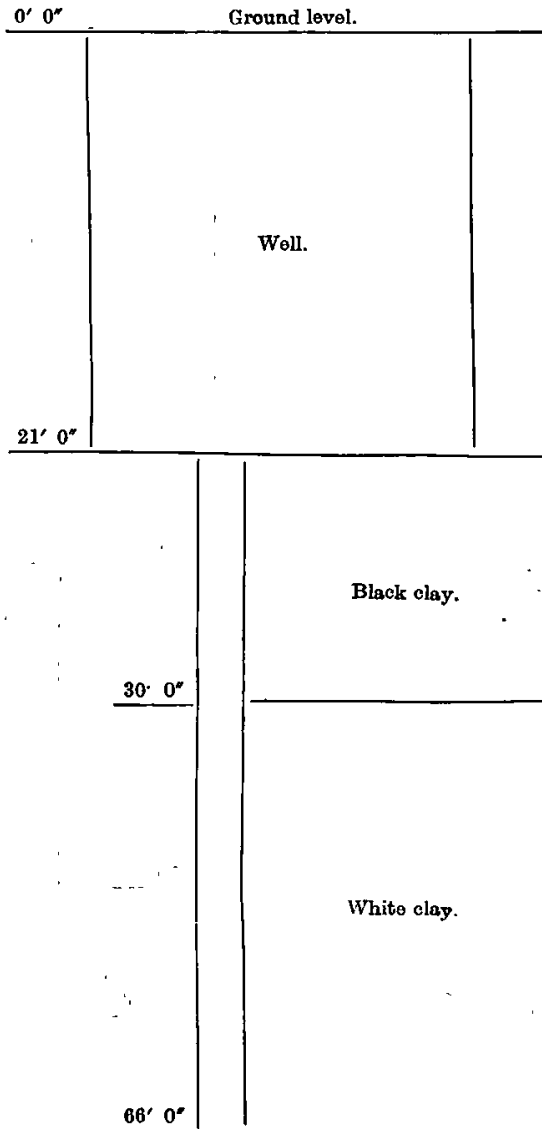
Taluk—Ponneri.

Village—Inedavayal.

Site of boring (survey number, etc.)—335.

Nearest railway station—

Name of the party—Mr. Annathin Mudaliyar.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

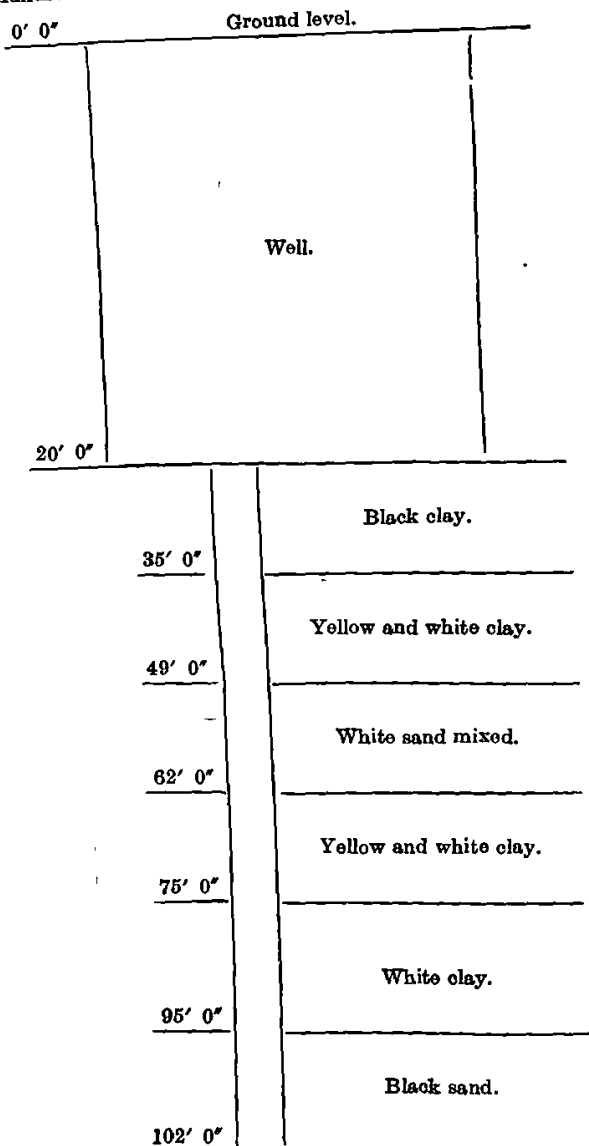
Taluk—Ponneri.

Village—Annamalaicherry.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—Mr. Munuswami Chetti.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

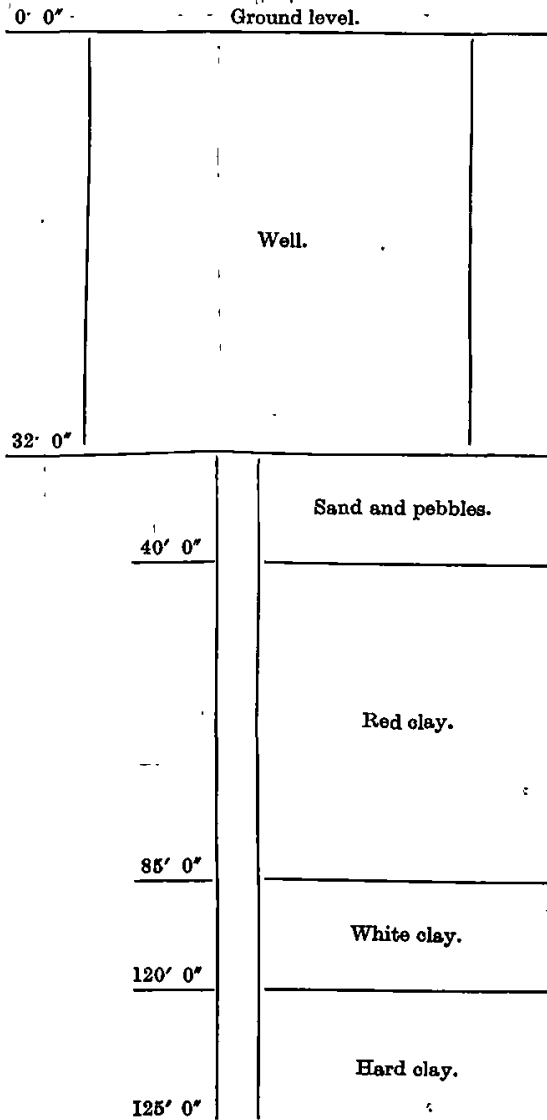
Taluk—Ponneri.

Village—Bodireddi Kandigai.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—Mr. Raghava Reddi.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

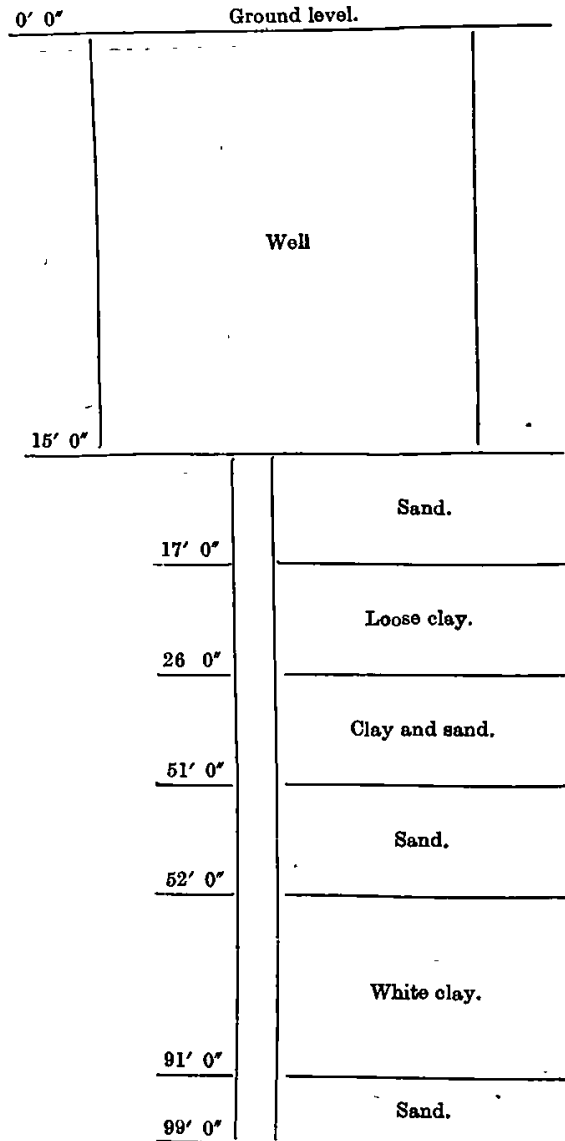
Taluk—Madras.

Village—Mylapore.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—Mr. Yekambara Ayyar, 1910.



CERAMIC SURVEY,

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

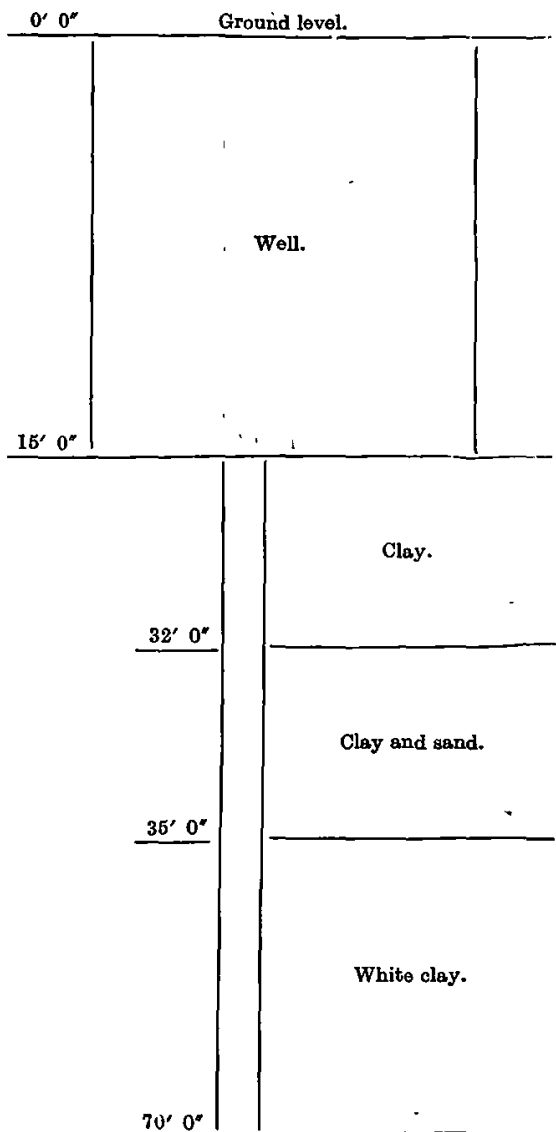
Taluk—Saidapet.

Village—Villivakkam.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—Mr. Rajagopala Chetti, 1911.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

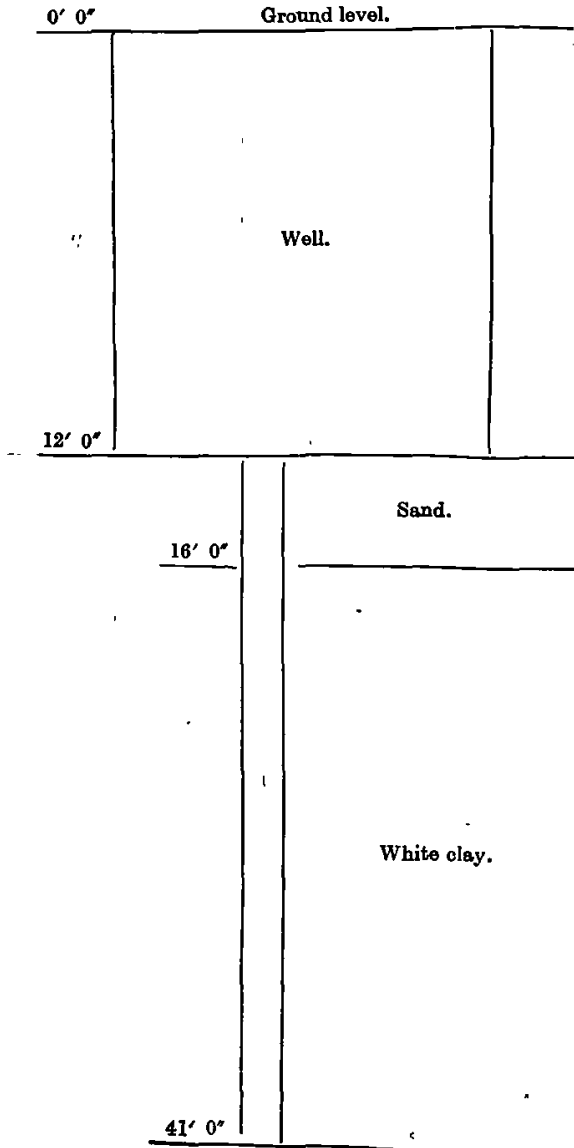
Taluk—Saidapet.

Village—Villivakam.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—Manicka Mudaliyar, 1911.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

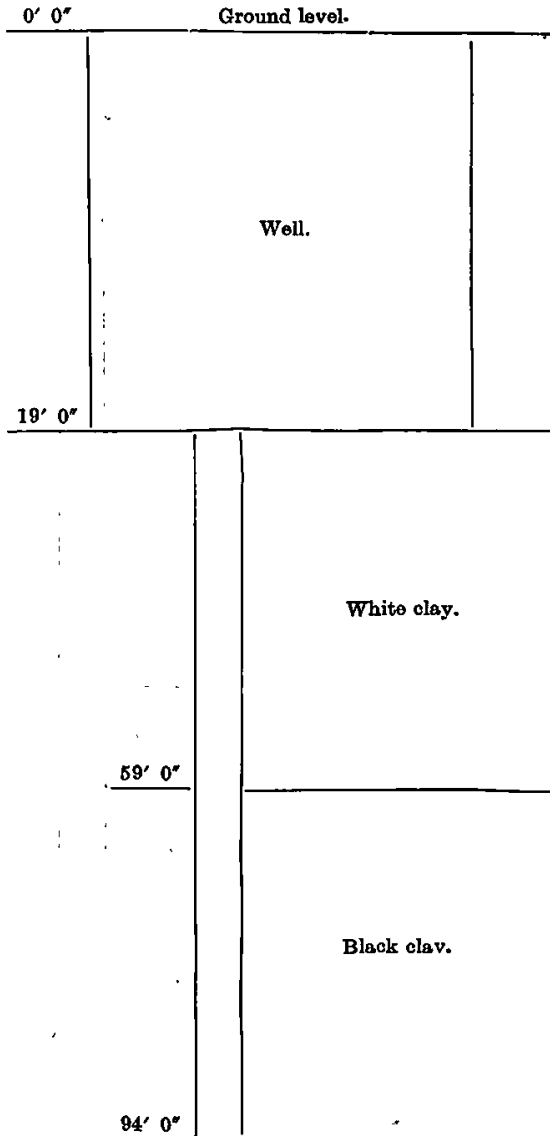
Taluk—Saidapet.

Village—Vanagaram.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—Mr. Doraiswami Nayakar, 1911.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

Taluk—Madras.

Village—Vyasarpadi.

Site of boring (survey number, etc.)—76.

Nearest railway station—

Name of the party—Mr. Audisesyaya, 1911.

	Ground level.
0' 0"	Slush.
5' 0"	
	Clay.
25' 0"	
	Lime sand.
40' 0"	
45' 0"	Chunam clay.
	White clay.
55' 0"	
58' 0"	Brown clay.
	Red clay.
61' 0"	
64' 0"	Gravel.
	Black sand.
67' 0"	

149

CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

Taluk—Saidapet.

Village—Red Hills.

Site of boring (survey number, etc.)—190.

Nearest railway station—

Name of the party—Mr. V. Daivasikamani Pillai, 1912.

0' 0"	Ground level.
7' 0"	Gravel.
36' 0"	White clay.
52' 0"	Hard clay.
54' 0"	Red clay.
68' 0"	Hard clay.
76' 0"	Clay.
44' 0"	Black clay.

CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

Taluk—Madras.

Village—Perambur.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—Messrs. Binny & Co., 1915.

0' 0"	Ground level.
8' 0"	Clay.
14' 0"	Black clay.
25' 0"	Sand and slush.
54' 0"	Sand and mud mixed.
72' 0"	White clay.
75' 0"	Red clay.
77' 0"	Clay and sand.
104' 0"	Hard rock.

161

CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

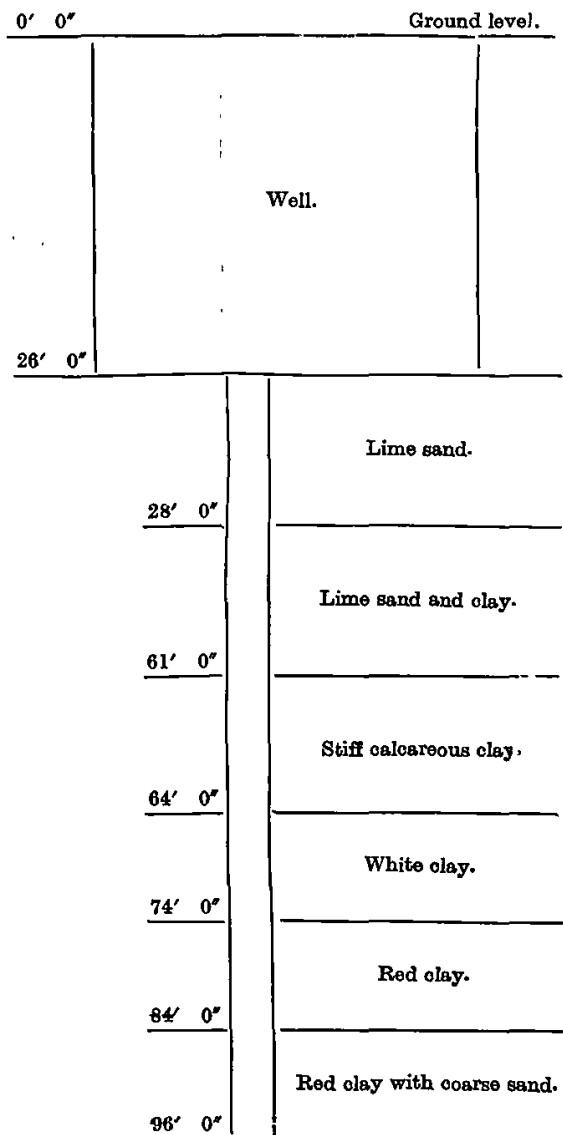
Taluk—Saidapet.

Village—Amjkarai.

Site of boring (survey number, etc.)—120.

Nearest railway station—

Name of the party—Mr. Swaminatha Pillai, 1913.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

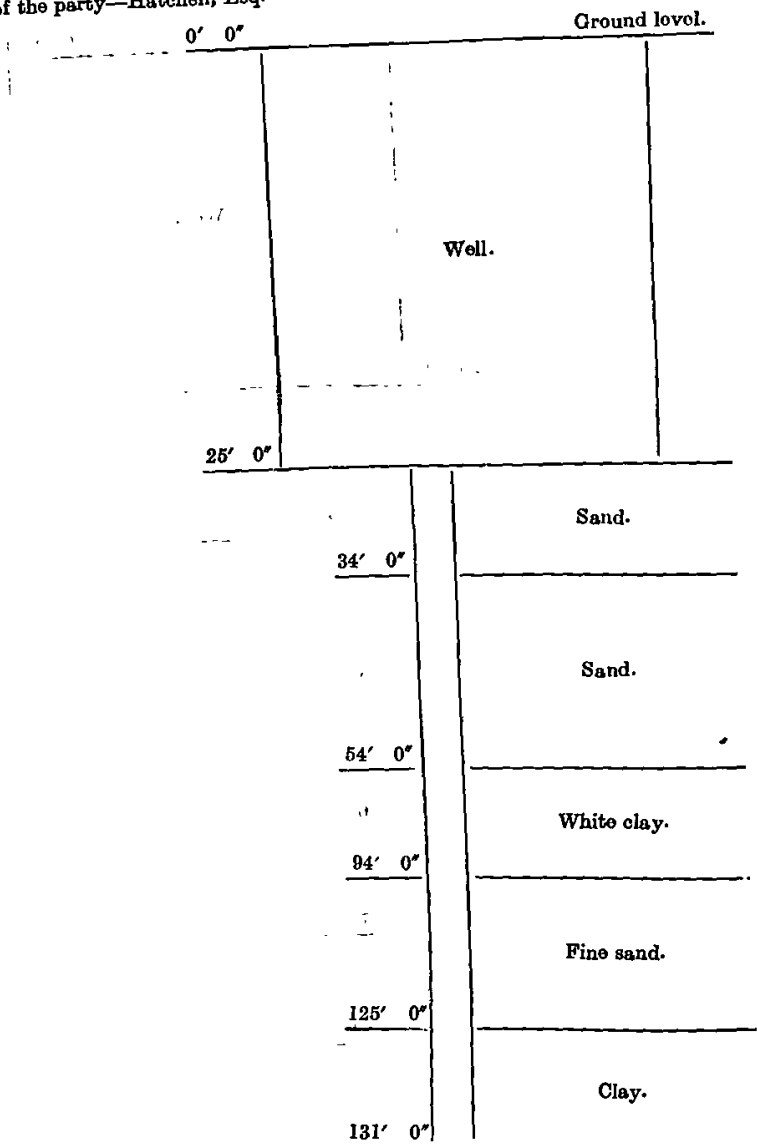
Taluk—Madras.

Village—Amjikalai.

Site of boring (survey number, etc.)—120.

Nearest railway station—

Name of the party—Hatchell, Esq.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

Taluk—Saidapet.

Village—Irungattukottai.

Site of boring (survey number, etc.)—390.

Nearest railway station—

Name of the party—Mr. Sreeramulu Nayudu.

0' 0"	Ground level.
4' 0"	Clay.
39' 0"	White clay.
85' 0"	Hard clay.
153' 0"	Hard black clay.
158' 0"	Slate colour clay.
208' 0"	Hard black clay.

. CERAMIC SURVEY.

. SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

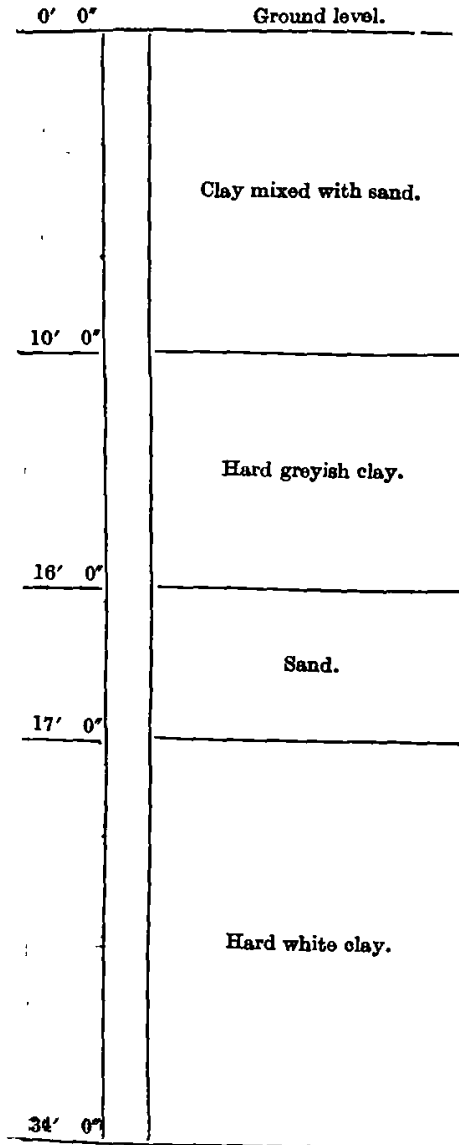
Taluk—Saidapet.

Village—Kovilampakkam.

Site of boring (survey number, etc.)—312.

Nearest railway station—

Name of the party—Gurukula Rangappa Nayudu, 1920.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

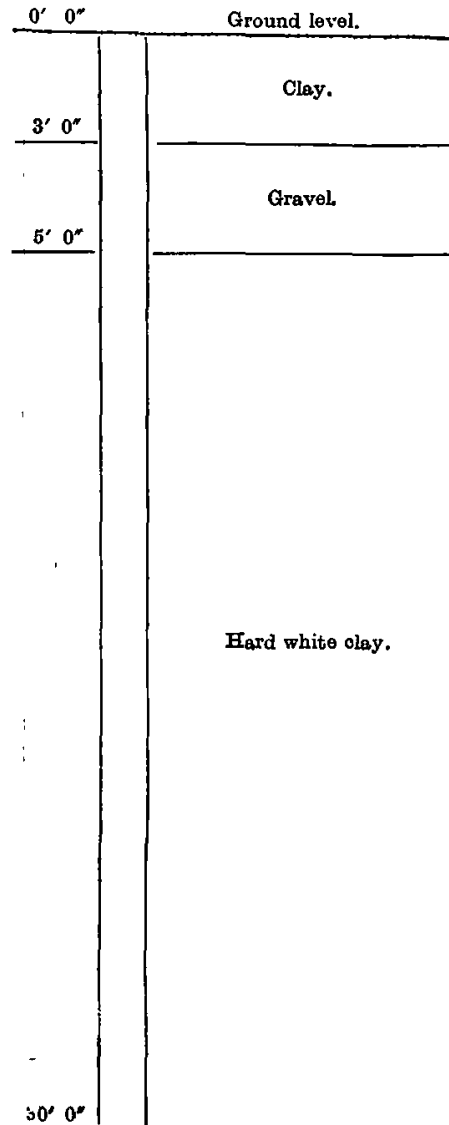
Taluk—Saidapet.

Village—Kovilampakkam.

Site of boring (survey number, etc.)—7.

Nearest railway station—

Name of the party—Gurukula Rangappa Nayudu.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

Taluk—Saidapet.

Village—Kolatur.

Site of boring (survey number, etc.)—263.

Nearest railway station—

Name of the party—Mr. Singaram Pillai, 1921, Zamin.

0' 0"	Ground level.
3' 0"	Clay.
6' 0"	Lacing clay.
9' 0"	Clay.
10' 6"	Gravel.
64' 6"	White clay.
66' 0"	Soft rock.
89' 0"	White clay like ochre
90' 0"	Sand mixed with clay.
100' 0"	White clay.
103' 0"	Hard clay.

CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Madras.

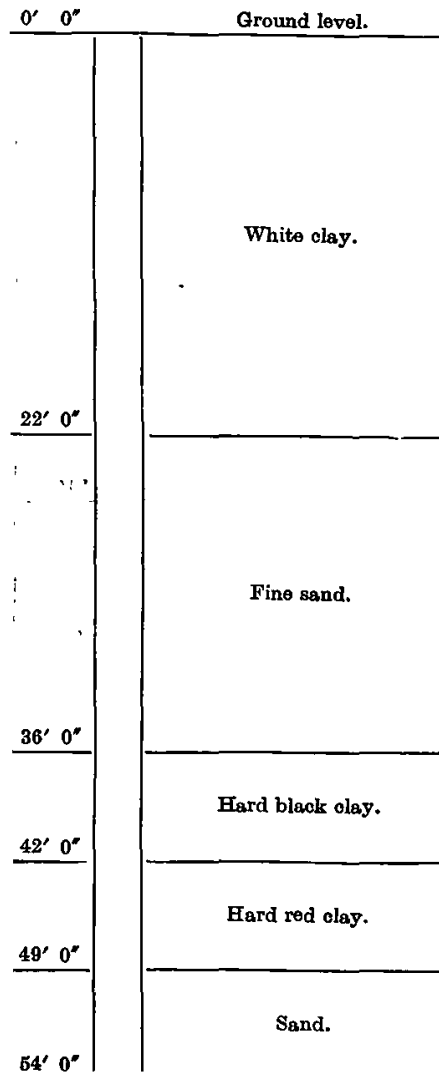
Taluk—

Village—

Site of boring (survey number, etc.)—People's Park.

Nearest railway station—

Name of the party—Revenue officer, Corporation of Madras, People's Park, 1925.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

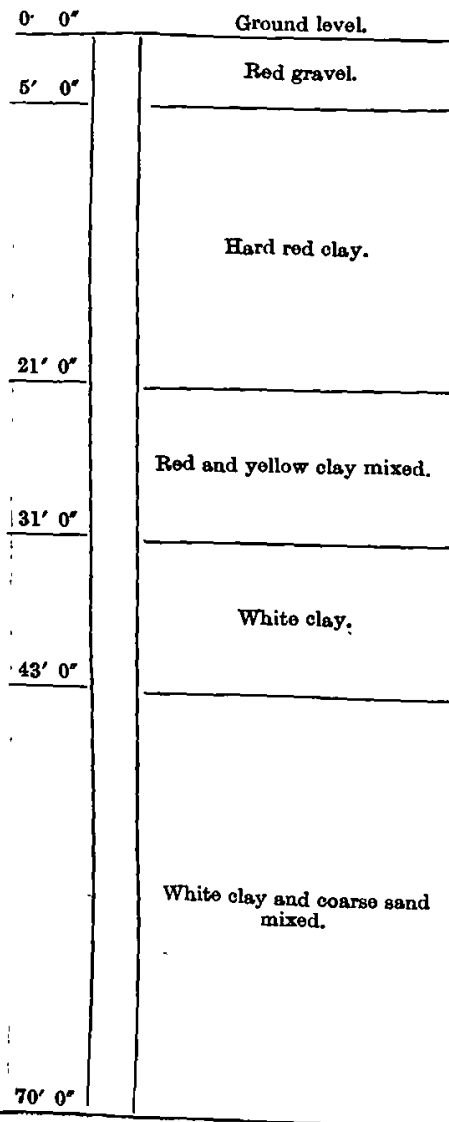
Taluk—Saidapet.

Village—Villivakkam.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—Mr. M. Singaram Pillai, 1925.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

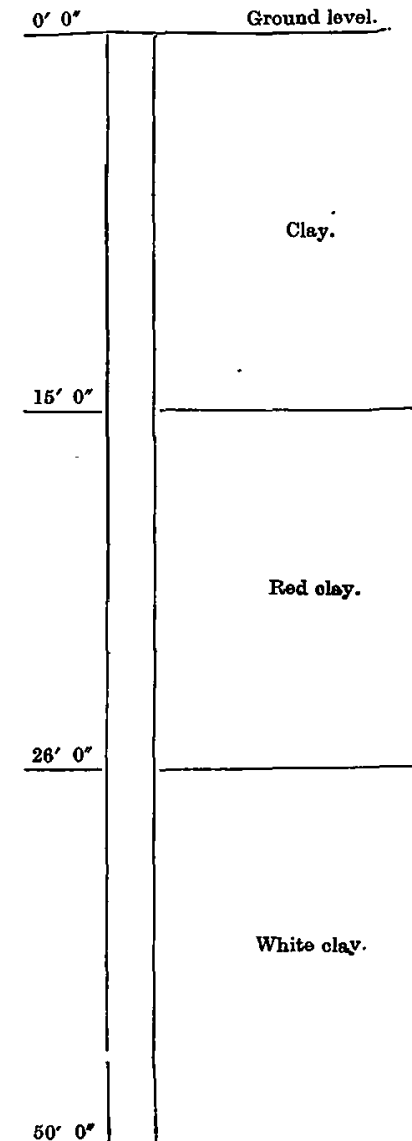
Taluk—Tiruvallur.

Village—Manjankaranai.

Site of boring (survey number, etc.)—196-A.

Nearest railway station—

Name of the party—Mr. Chengalroya Nayudu, 1908.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

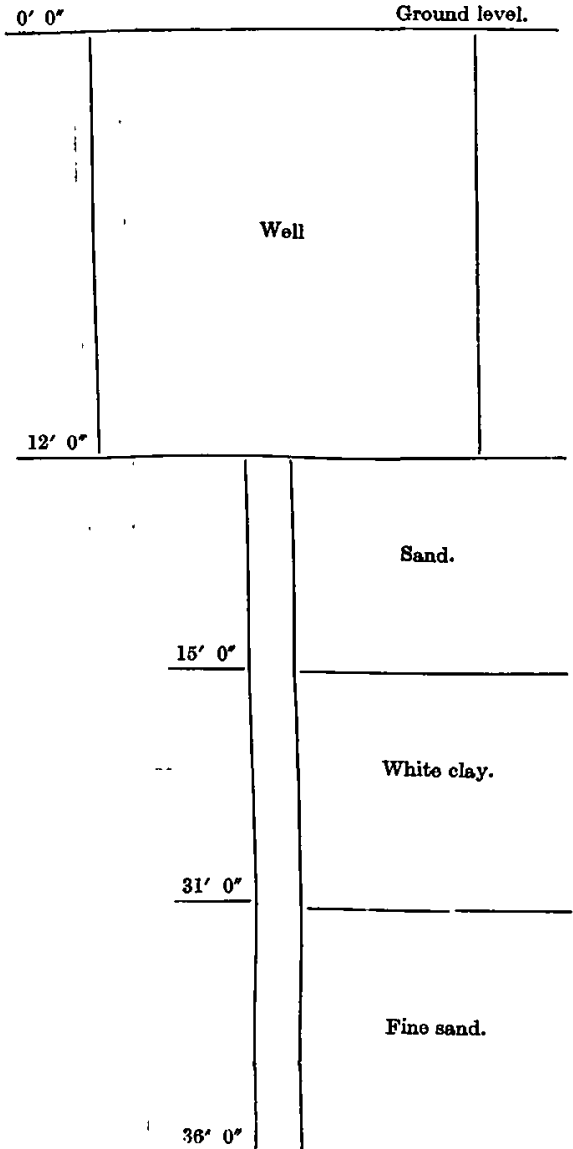
Taluk—Tiruvallur.

Village—Kanakavallipuram.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—Rev. R. Shomerus, 1908



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

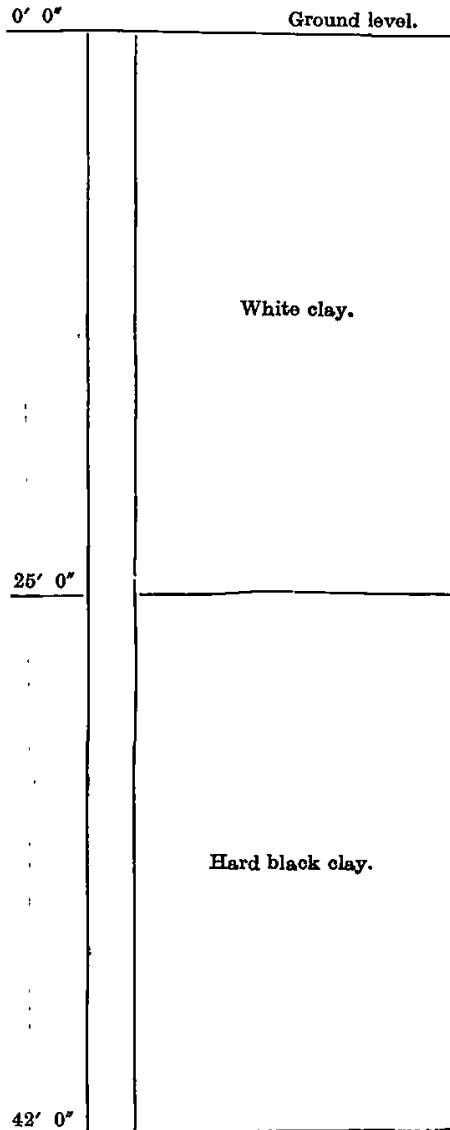
Taluk—Tiruvallur.

Village—Vellore.

Site of boring (survey number, etc.)—359.

Nearest railway station—

Name of the party—Mr. Appavu Nayudu, 1911.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

Taluk—Tiruvallur.

Village—Velliyur.

Site of boring (survey number, etc.)—589-B

Nearest railway station—.

Name of the party—Mr. Viraswami Nayudu.

0' 0"	Ground level.
	White clay.
13' 0"	
14' 0"	Sand.
	Sand and white clay.
20' 0"	
	White clay and sand.
30' 0"	
	Clay and sand.
35' 0"	
	Sand.
38' 0"	

CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

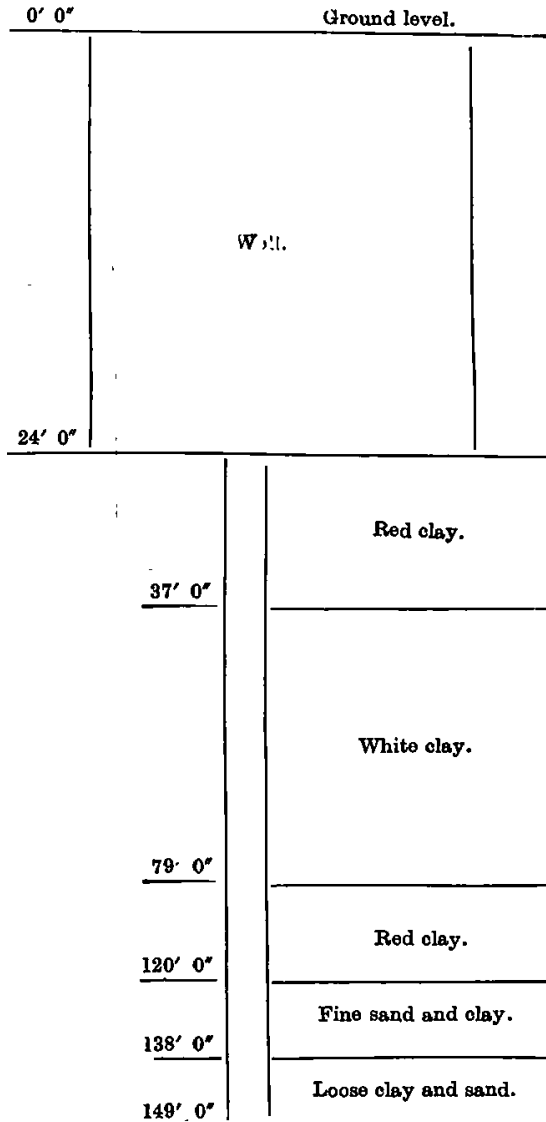
Taluk—Tiruvallur.

Village—Thervoy.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—Mr. Theayagaraja Chetti, 1911.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

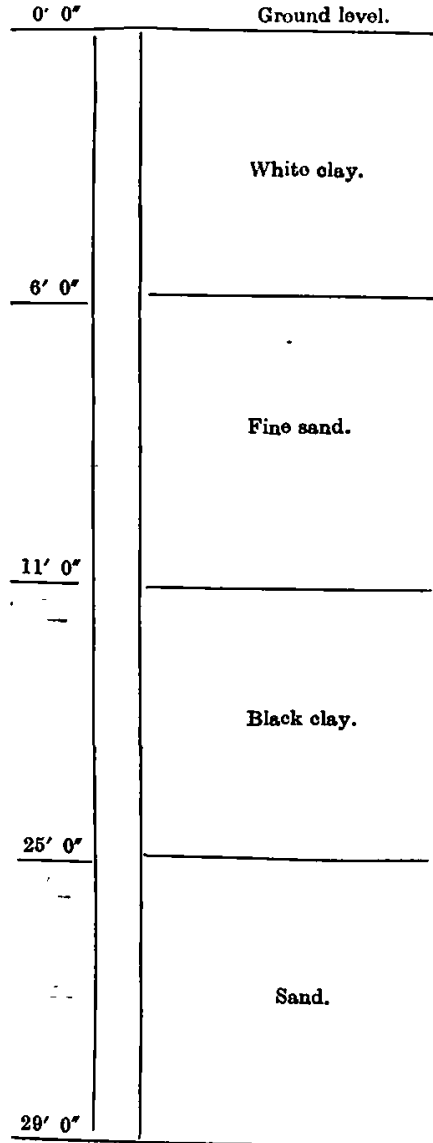
Taluk—Tiruvallur.

Village—Vembakkam.

Site of boring (survey number, etc.)—213.

Nearest railway station—

Name of the party—Mr. Krishna Sastri, 1914.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

Taluk—Tiruvallur.

Village—Vembakkam.

Site of boring (survey number, etc).—30/5.

Nearest railway station—

Name of the party—Mr. Krishna Sastri, 1914.

0' 0"	Ground level.
	White clay.
8' 0"	
	Sand.
9' 0"	
	Black clay.
12' 0"	
	Fine sand.
14' 0"	
	Black stiff clay.
26' 0"	
	Sand.
27' 0"	
	Sand and clay.
31' 0"	
	Calcareous clay.
43' 0"	

CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingelput.

Taluk—Tiruvallur.

Village—Pennalurpet.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—Mr. P. Subba Nayudu, 1915.

0' 0"	Ground level.
	Clay.
19' 0"	
	White clay.
26' 6"	
	Slush.
31' 0"	
	Red clay.
36' 0"	
	Coarse sand.
43' 0"	
	Slush.
49' 0"	
	Sand and slush.
51' 0"	

CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

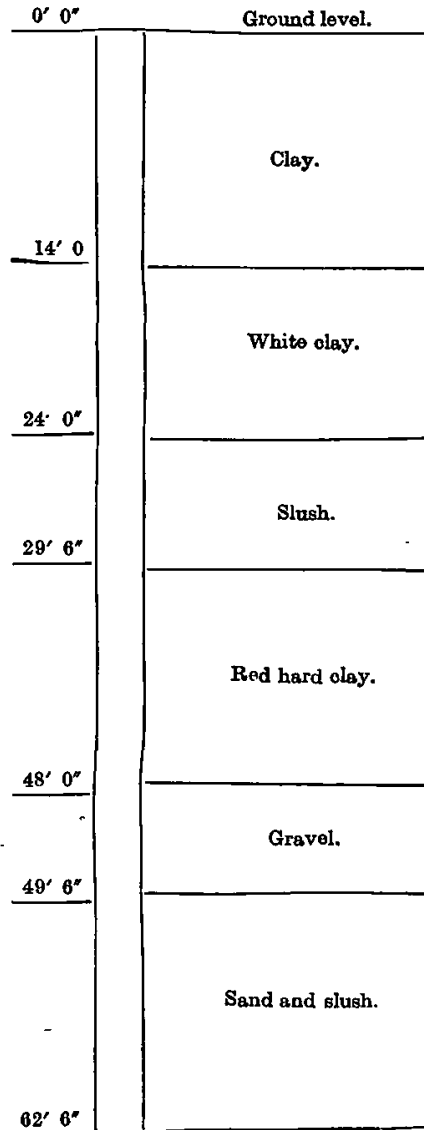
Taluk—Tiruvallur.

Village—Pennalurpet.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—Mr. P. Subba Nayudu, 1915.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

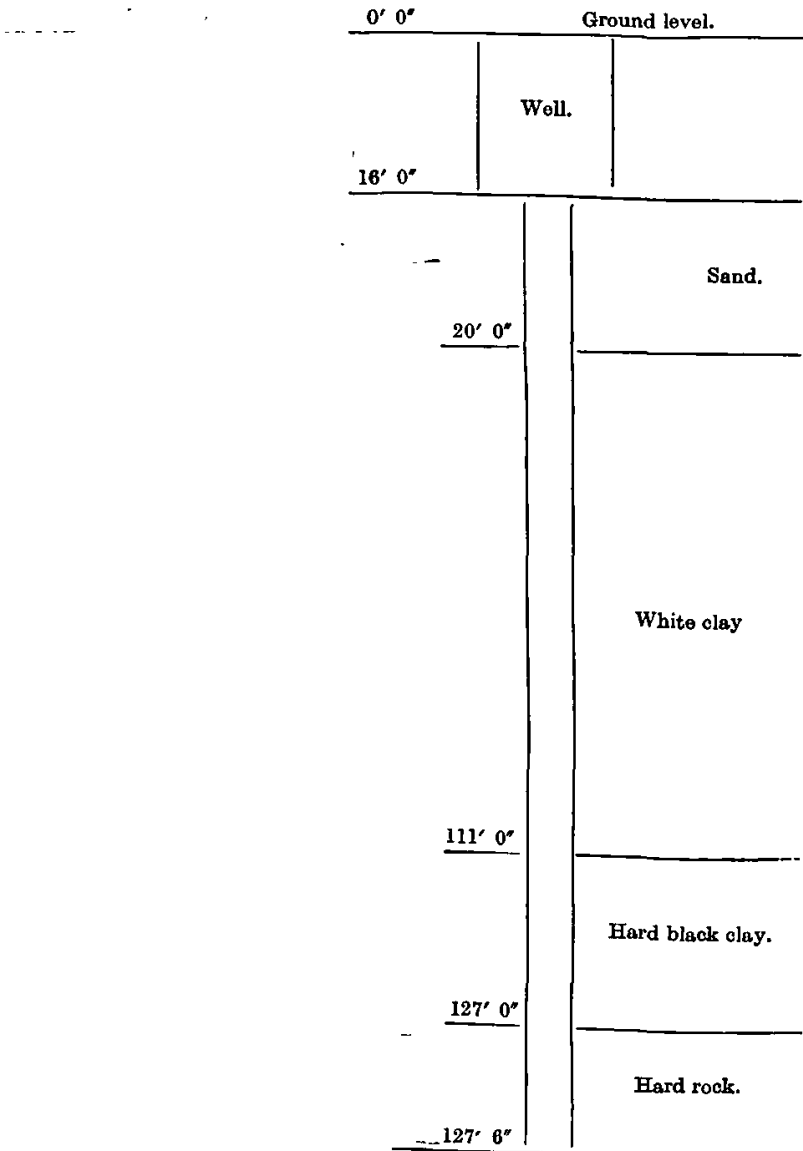
Taluk—Tiruvallur.

Village—Kakalur.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—Mr. Krishnaswami Mudaliyar, 1918.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

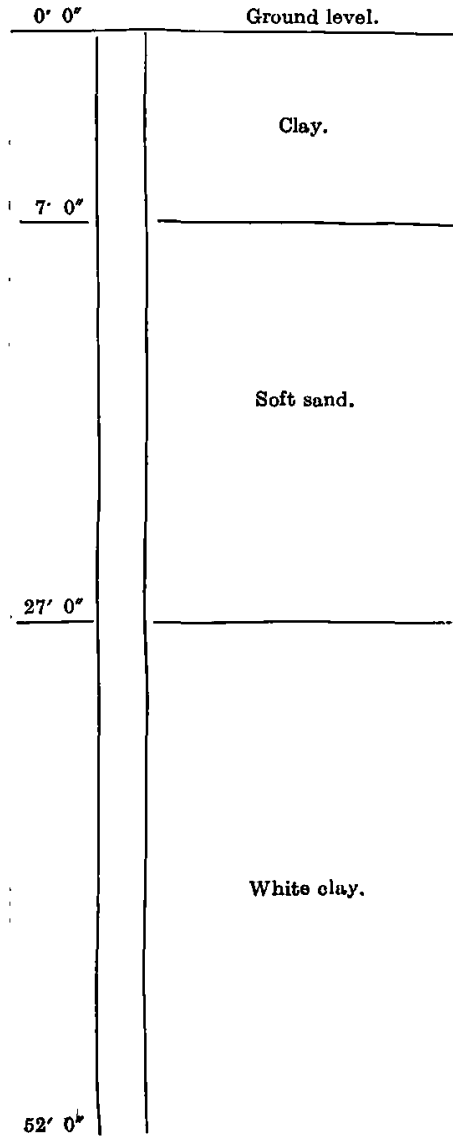
Taluk—Tiruvallur.

Village—Kakalur.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—Mr. Krishnaswami Mudaliyar, 1913.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

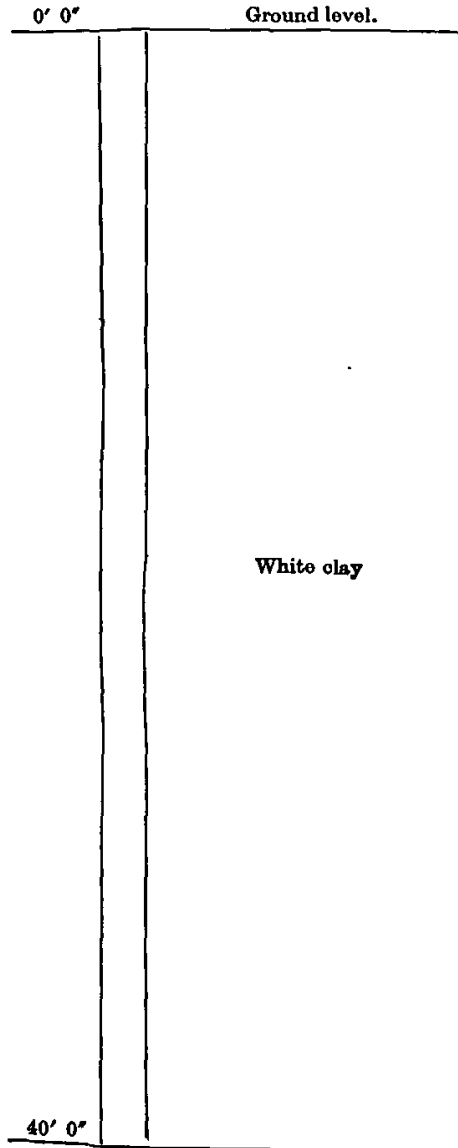
Taluk—Tiruvallur.

Village—Periakuppam.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—John Devasigamani, 1918.



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CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

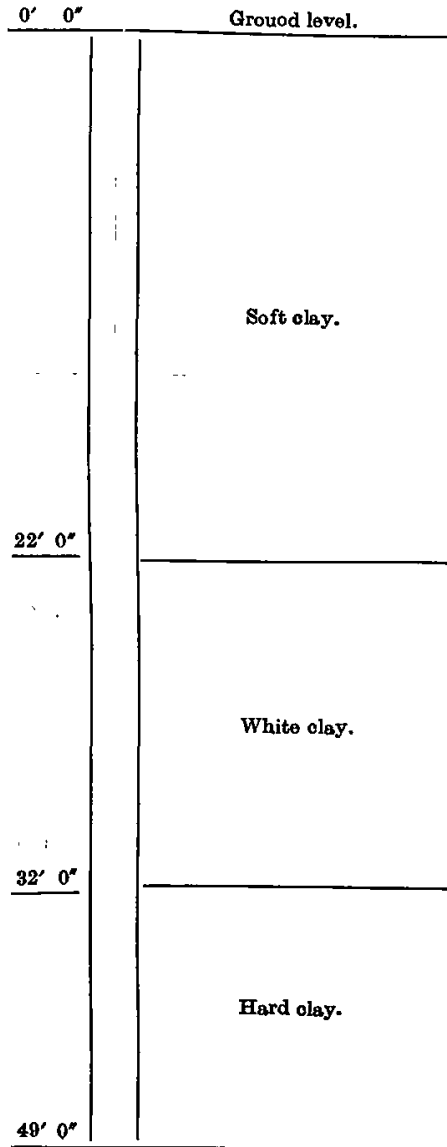
Taluk—Tiruvallur.

Village—Magural.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—Mr. Gopal Nayudu, 1918. -



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

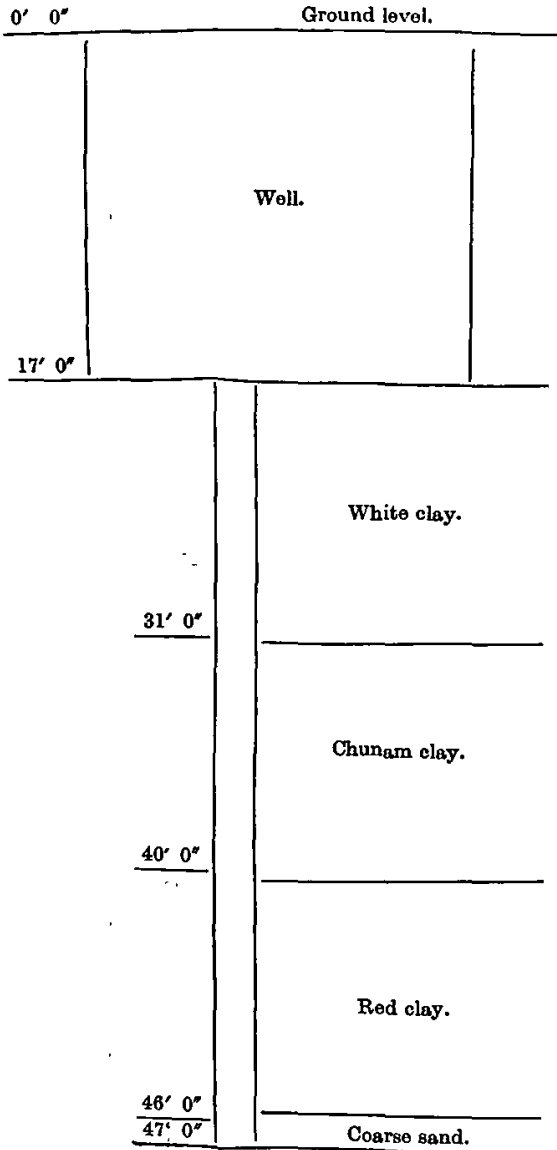
Taluk—Tiruvallur.

Village—Karani.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the Party—Mr. A. Murugappa Reddi, 1927.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

Taluk—Tiruvallur.

Village—Kusavanpalayam.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—Mr. Parasurama Mudaliyar, 1928.

0' 0"	Ground level.
Well.	
19' 0"	
21' 0"	Sand.
	Hard black clay.
24' 0"	
	White clay and sand.
29' 0"	
	White clay.
43' 0"	
	Brown clay.
47' 0"	
49' 0"	Coarse sand.

CERAMIC SURVEY.

SECTION OF BOREHOLE PUT DOWN.

District—Chingleput.

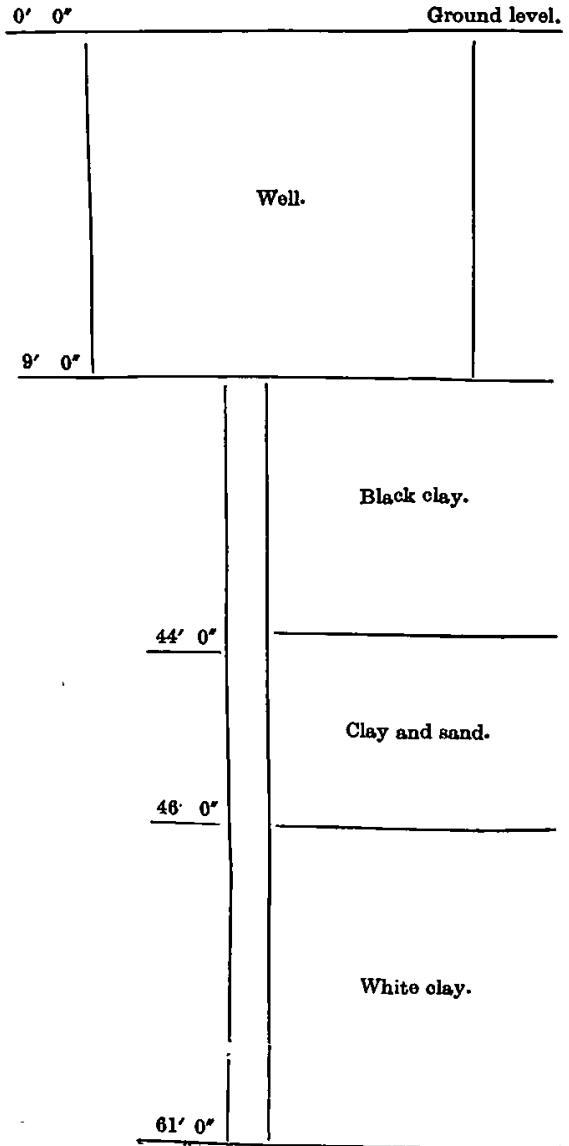
Taluk—Madurantakam.

Village—Sethanjeri.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—



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CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

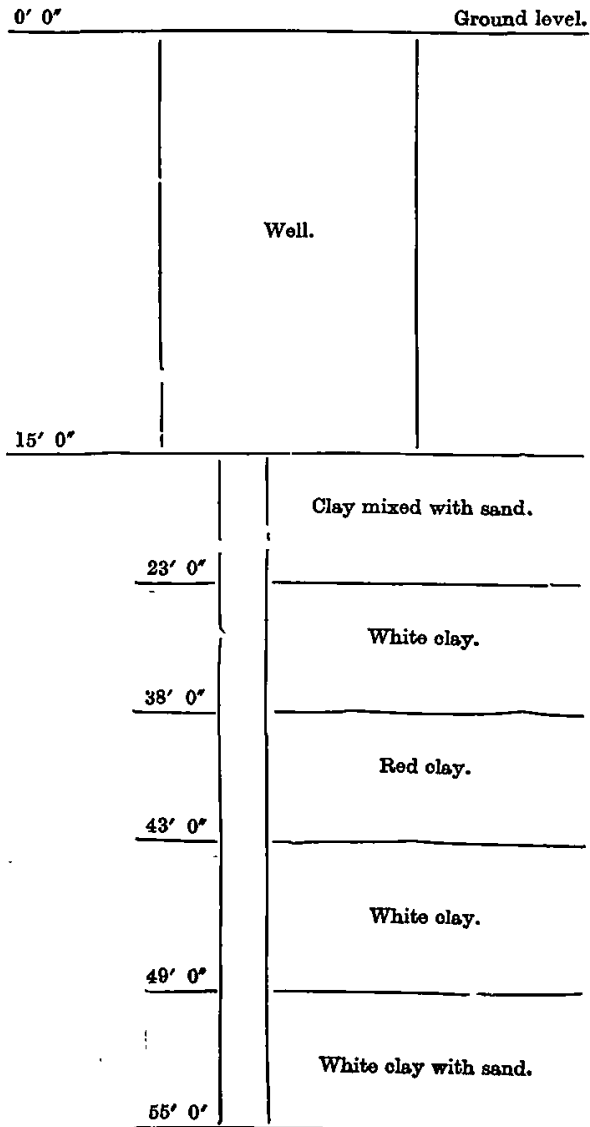
Taluk—Madurantakam.

Village—Maiyur.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

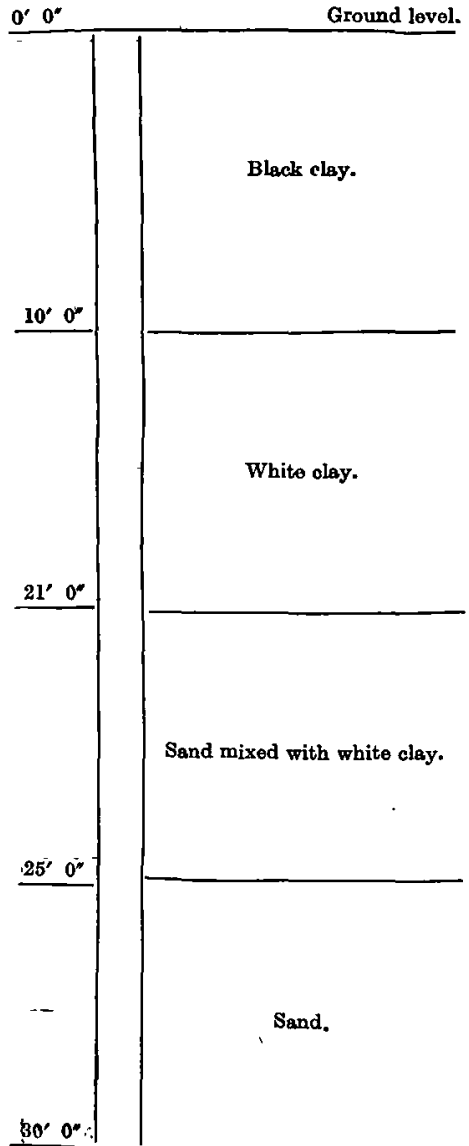
Taluk—Conjeeveram.

Village—Big Conjeeveram.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—Mr. Ramasesha Ayyar.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Chingleput.

Taluk—Conjeeveram.

Village—Olukkolpattu.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—Mr. Paramasiva Mudaliyar.

0' 0"	Ground level.	
Well.		
12' 0"		
24' 0"	Sand.	
32' 0"	White clay.	
42' 0"	Black clay.	
47' 0"	Red clay.	
50' 0"	Red gravel.	

CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Cuddapah district.

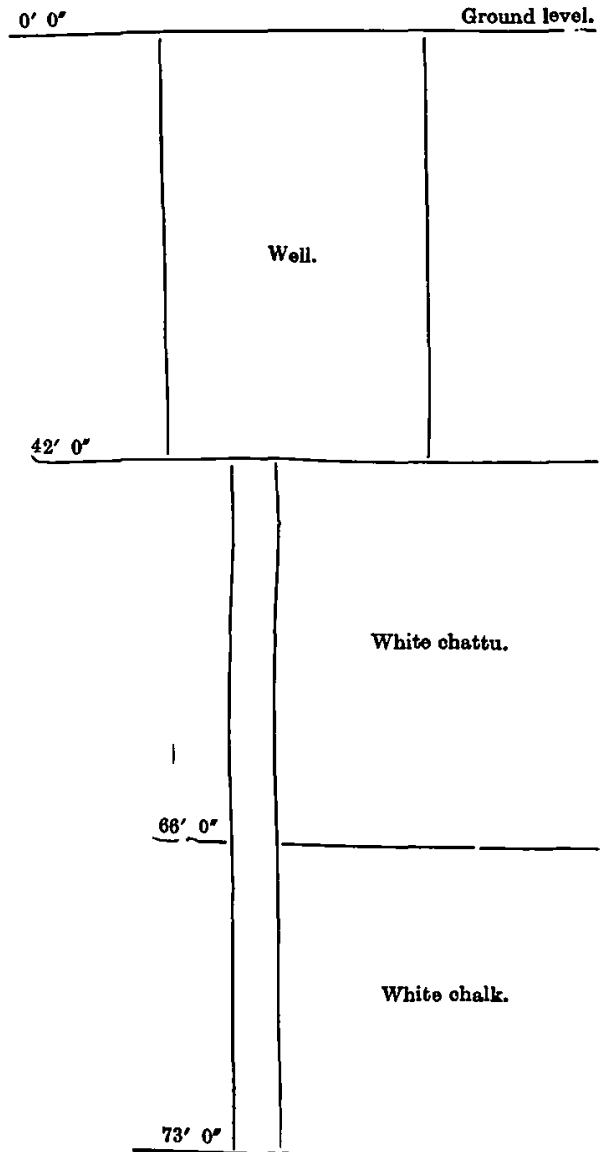
Taluk—Proddatur.

Village—Yerraguntla.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Cuddapah.

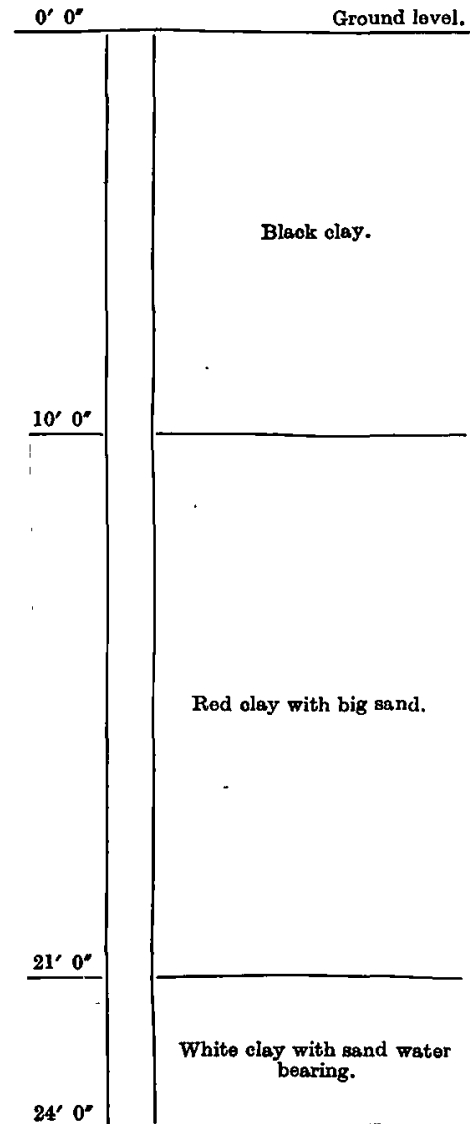
Taluk—Pulivendla.

Village—Surabhin.

Site of boring (survey number, etc.)—Tankbed

Nearest railway station—

Name of the party—



CERAMIC SURVEY.

SECTION OF BOREHOLE PUT DOWN.

District—Cuddapah.

Taluk—Pulivendla.

Village—Surabhin.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—

0' 0"	Ground level
58' 0"	Hard lime clay.
73' 0"	Coarse sand water bearing.
75' 0"	Hard lime stone.
81' 0"	White clay.
88' 0"	Clay with lime stone.
91' 0"	Hard rock.

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CERAMIC SURVEY.)

SKETCH OF BOREHOLE PUT DOWN.

District—Cuddapah.

Taluk—Pulivendla.

Village—Surabhin.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—

0' 0"	Ground level
13' 8"	
19' 8"	Sand.
22' 8"	Sand.
24' 8"	Hard white clay.
25' 8"	Sand mixed with clay.
28' 8"	Pure water bearing and sand.

CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Cuddapah.

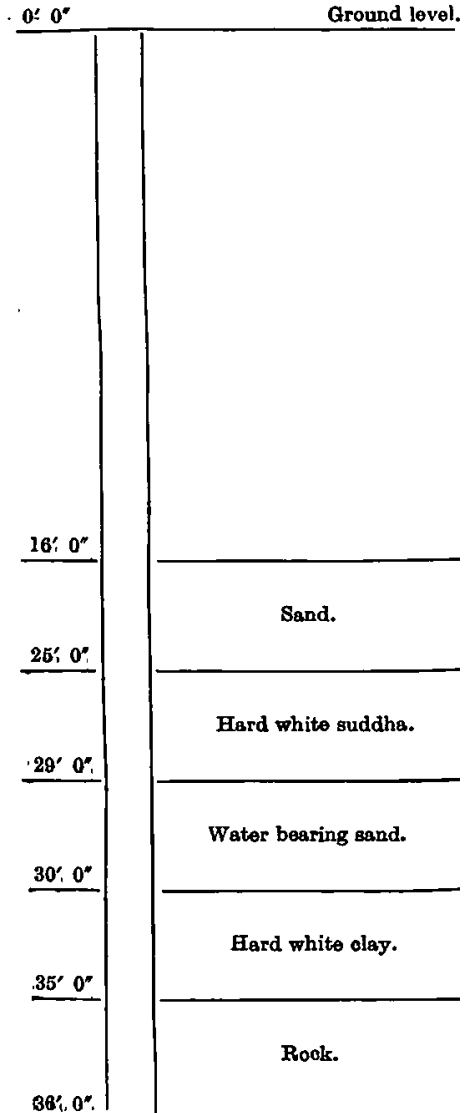
Taluk—Pulivendla.

Village—Surabhin.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Cuddapah.

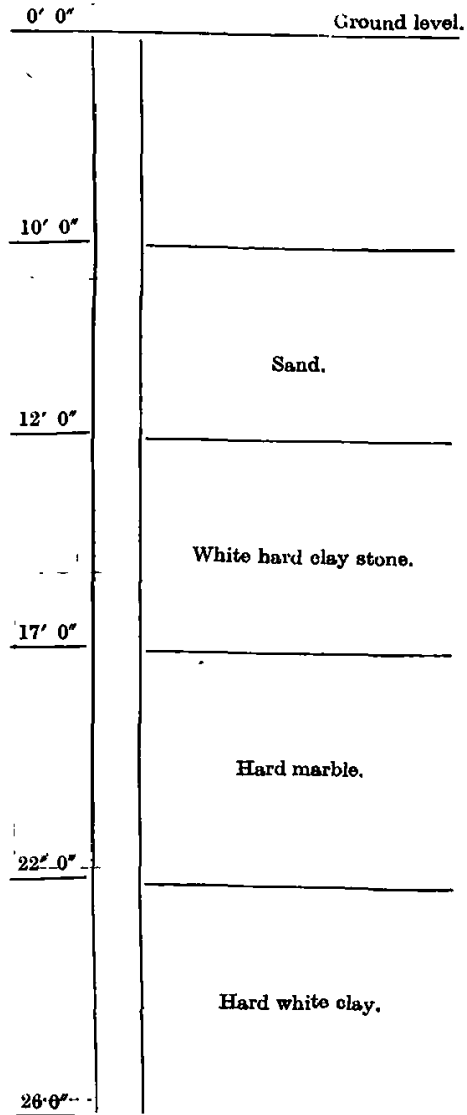
Taluk—Pulivendla.

Village—Surabhin.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—



GERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Ganjam.

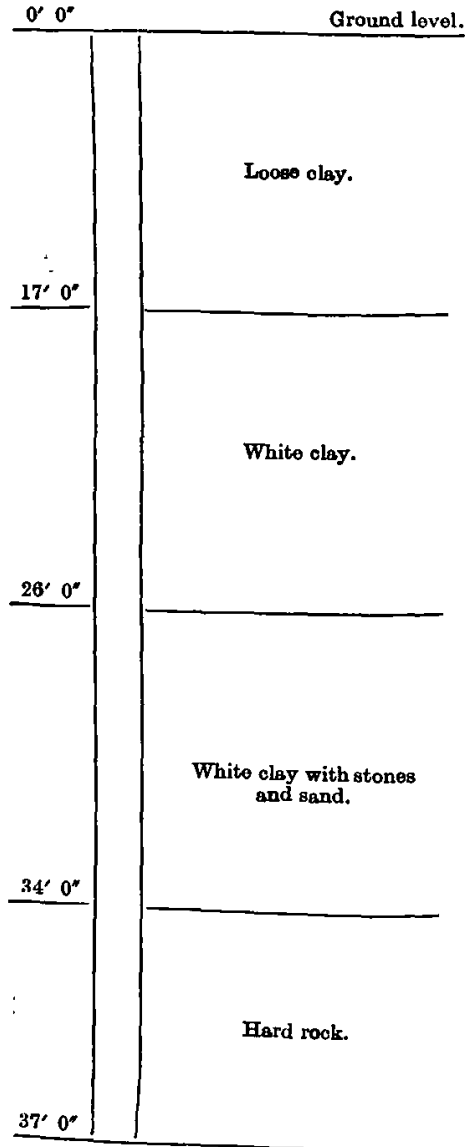
Taluk—Chicacole.

Village—Amdalvalsa.

Site of boring (survey number, etc.)—In the mill compound.

Nearest railway station—

Name of the party—Varada Kameswara Rao Nayudu, 1927.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Ganjam.

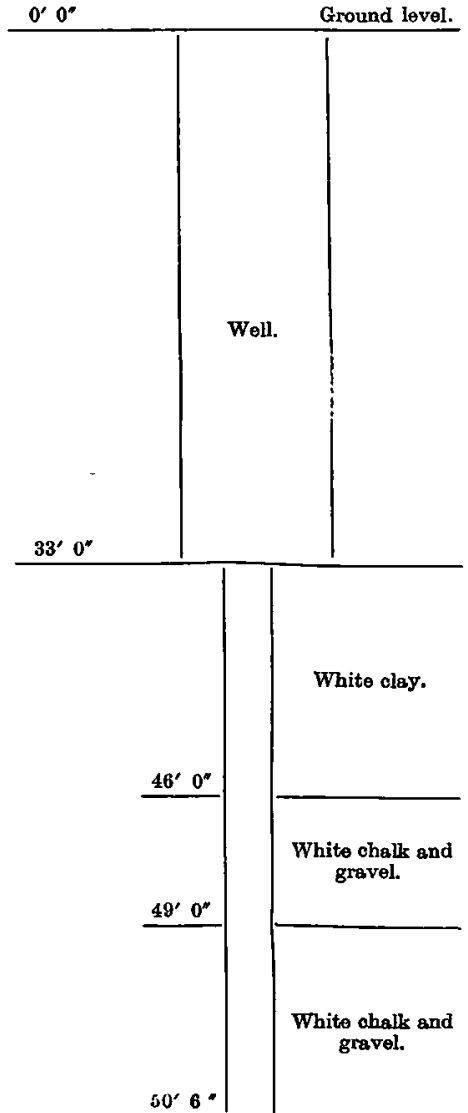
Taluk—Tekkali.

Village—Palavalsa.

Site of boring (survey number, etc.)—Palavalsa near Panchamas cheri No. 2.

Nearest railway station—

Name of the party—Taluk Board, Chicacole.



CERAMIC SURVEY.

SKETCH OF BORRHOLE PUT DOWN.

District—Ganjam.

Taluk—Berhampur.

Village—Rampalli.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—Mr. Kodanda Ramayya Pantulu, 1911.

0' 0"	Ground level.
	Red kankar.
14' 0"	
	White clay mixed with sand.
47' 0"	
	White soft rock.
61' 0"	
	Red earth mixed with sand.
71' 0"	
	Hard rock.
107' 0"	

CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—South Kanara.

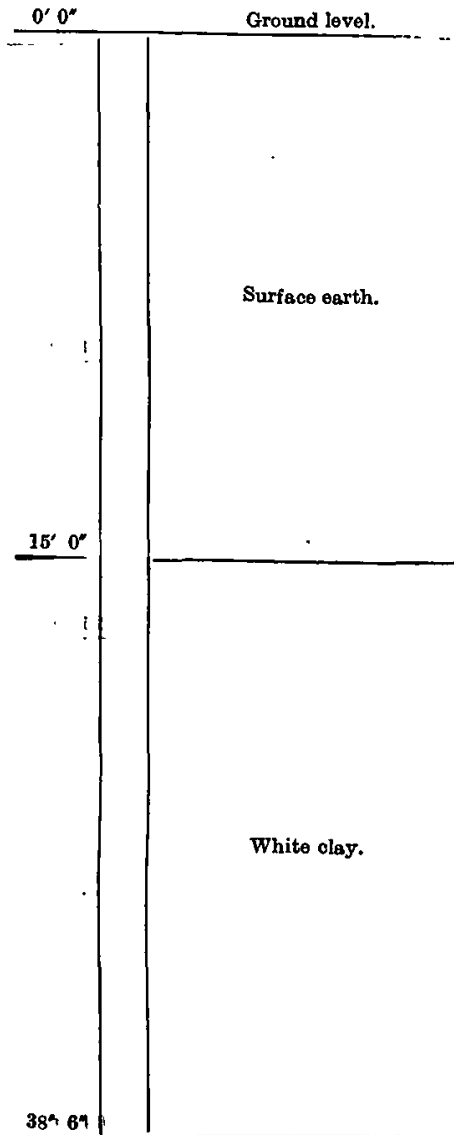
Taluk—Kasaragod.

Village—Bela.

Site of boring (survey number, etc.)—189/1.

Nearest railway station—

Name of the party—S. E. Rego, Esq.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Kurnool.

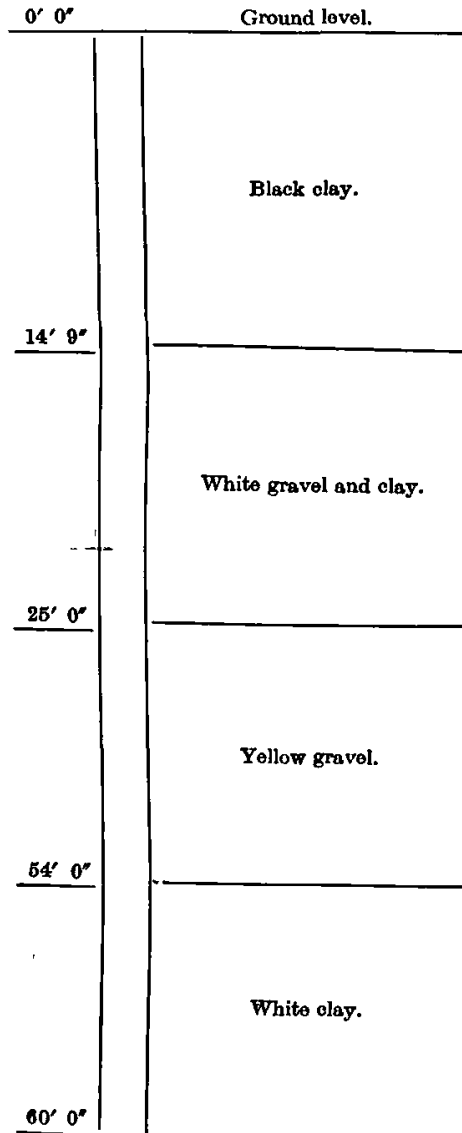
Taluk—Nandyal.

Village—Kaipai.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—Nagur Nagappa Chetti.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Kurnool.

Taluk—Nandyal.

Village—Nandyal.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—Farm Manager, Agricultural Farm.

0' 0"	Ground level.
	Clay.
8' 0"	
	Yellow clay and sand.
21' 0"	
	White clay and sand.
23' 0"	
	White clay and pebbles.
27' 6"	
	Black and yellow clay mixed.
30' 6"	
	Black clay.
32' 3"	
	Hard yellow clay.
39' 6"	
	Soft red rock.
48' 0"	

CERAMIC SURVEY.

SECTION OF BORSHOLE PUT DOWN.

District—Kurnool.

Taluk—Kurnool.

Village—Voravakallu.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—Chanur Sanjeevi Reddi Garu.

0 0"	Ground level.
	Black clay and stones.
6' 0"	
	Half side rock and half side clay.
13' 6"	
	Very hard rock.
14' 0"	
	Soft rock.
19' 0"	
	Hard rock.
21' 0"	
	Soft rock.
25' 0"	
	Chalk.
26' 0"	
	Hard rock.
31' 1"	
	Soft rock.
30' 0"	

CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Malabar.

Taluk—Chirakkal.

Village—

Site of boring (survey number, etc.)—215.

Nearest railway station—

Name of the party—General Manager, Commonwealth Trust, Calicut.

0' 0"	Ground level.
2' 0"	Earth.
20' 0"	Hard laterite.
27' 0"	Soft laterite.
28' 0"	Red clay.
29' 0"	Shady.
37' 0"	Clay.
42' 0"	Yellow clay.
44' 0"	Clay with sand.
48' 0"	Pebble.
53' 0"	Clay.
62' 0"	Clay with sand.
65' 0"	Hard black clay.
69' 0"	White clay.
78' 0"	Black clay.
83' 0"	Sand.
87' 0"	White clay.
90' 0"	Clay with sand.

CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Trichinopoly.

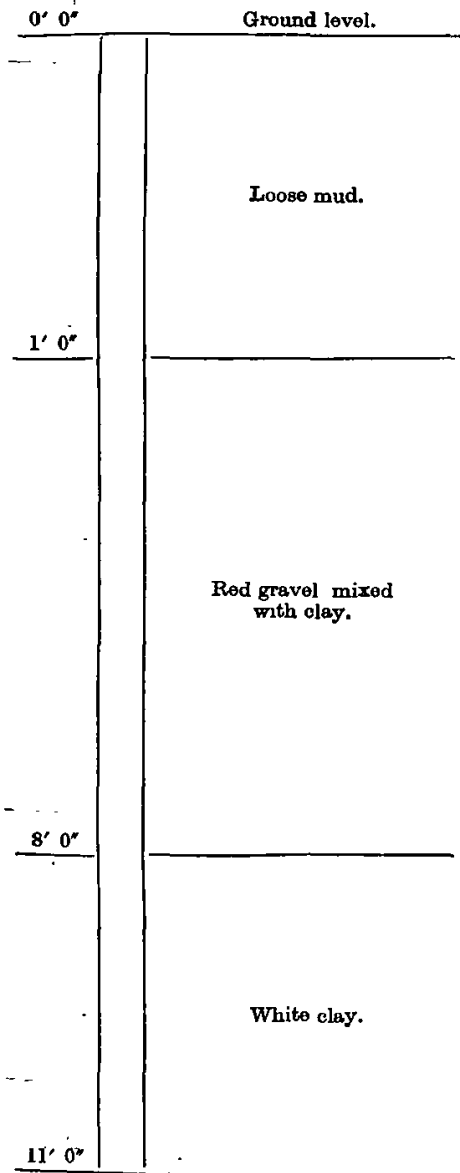
Taluk—Trichinopoly.

Village—Trichinopoly Cantonment.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—The Executive Engineer, Public Works Department.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Trichinopoly.

Taluk—Trichinopoly.

Village—Trichinopoly Cantonment.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—The Executive Engineer, Public Works Department—

0' 0"	Ground level.
	Loose soil.
2' 0"	
	Gravel with clay.
5' 0"	
	White clay.
8' 0"	
	Soft limestone rock.
12' 0"	
	Hard black rock.
24' 0"	
	Soft yellow rock.
31' 6"	

CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Trichinopoly.

Taluk—Trichinopoly.

Village—Panchapur.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—V. Krishnaswami Ayyangar.

0' 0"	Ground level.
	Loose earth.
5' 0"	
	Loose white clay.
27' 0"	
	Stiff white clay.
36' 0"	
	Sand.
36' 6"	
	Soft rock.
43' 6"	
	Hard white rock.
51' 6"	
	Sand.
52' 0"	

CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Trichinopoly.

Taluk—Trichinopoly.

Village—Panchapur.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—V. Krishnaswami Ayyangar.

0' 0"	Ground level.
-	Loose clay.
11' 0"	Soft rock.
19' 0"	White clay.
37' 0"	Hard white rock.
39' 6"	Sand.
40' 0"	

CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Trichinopoly.

Taluk—Trichinopoly.

Village—Panchapur.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—V. Krishnaswami Ayyangar. . .

0' 00"	Ground level.
	Compact soil with sand.
10' 0"	
	White clay.
16' 0"	
	Hard chukkan.
18' 0"	
	Soft rock.
28' 0"	
	Hard rock.
29' 0"	
	Sand and clay.
31' 0"	

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CERAMIC SURVEY.

SECTION OF BORING PUT DOWN.

District—Trichinopoly.

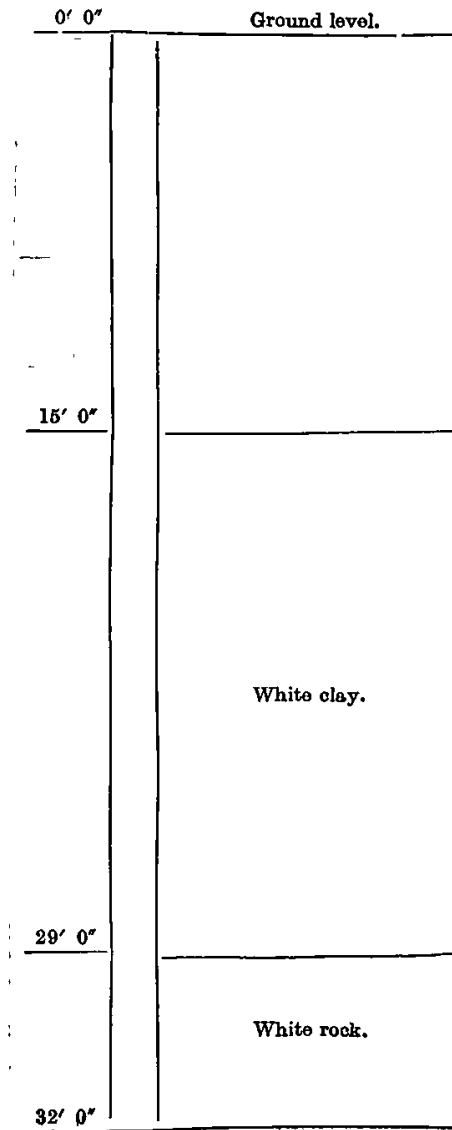
Taluk—Trichinopoly.

Village—Trichinopoly.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—Vemulu Ayyar.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Trichinopoly.

Taluk—Udaiyarpalaiyam.

Village—Sripurandam.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—Mr. V. Ramaswami Ayyangar.

0' 0"	Ground level.
	Loose soil and clay.
57' 0"	
	White clay.
65' 0"	
	Reddish clay.
68' 6"	
	Yellowish clay.
75' 0"	
	Sand.
76' 6"	
	Clay with sand.
82' 0"	
	Sand.
84' 6"	
	Sand with clay.
86' 0"	
	Clay with sand.
90' 0"	

CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Trichinopoly.

Taluk—Udaiyarpalaiyam.

Village—Arupurandum.

Site of boring (survey number, etc.).—

Nearest railway station—

Name of the party—Mr. Srinivasa Ayyar.

0' 0"	Ground level.
3' 0"	Black loose earth.
6' 0"	Hard red earth.
	Hard stiff red earth.
18' 0"	
24' 0"	Hard stiff dry white clay.
32' 0"	Hard stiff yellow clay.
33' 0"	White clay.
40' 0"	Red clay with sand.
	Red clay.
51' 0"	
53' 0"	White clay.
57' 0"	Red clay with sand.
58' 0"	White clay.
59' 0"	Red clay.
62' 0"	White clay with sand.
	Whitish clay.
68' 0"	
73' 0"	Whitish clay with sand.
79' 0"	Sand with some clay.
85' 0"	Sand with white clay.

CERAMIC SURVEY.

SKETCH OF BORRHOLE PUT DOWN.

District—Trichinopoly.

Taluk—Lalgudi.

Village—Bhikshandarkoil.

Site of boring (survey number, etc.)—Railway station site.

Nearest railway station—

Name of the party—Mr. G. Rajagopal Pillai.

0' 0"	Ground level.
15' 0"	Sand.
21' 0"	Black clay.
50' 0"	White clay.
54' 6"	Sand.
60' 0"	Rock boulder.
62' 0"	

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CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Trichinopoly.

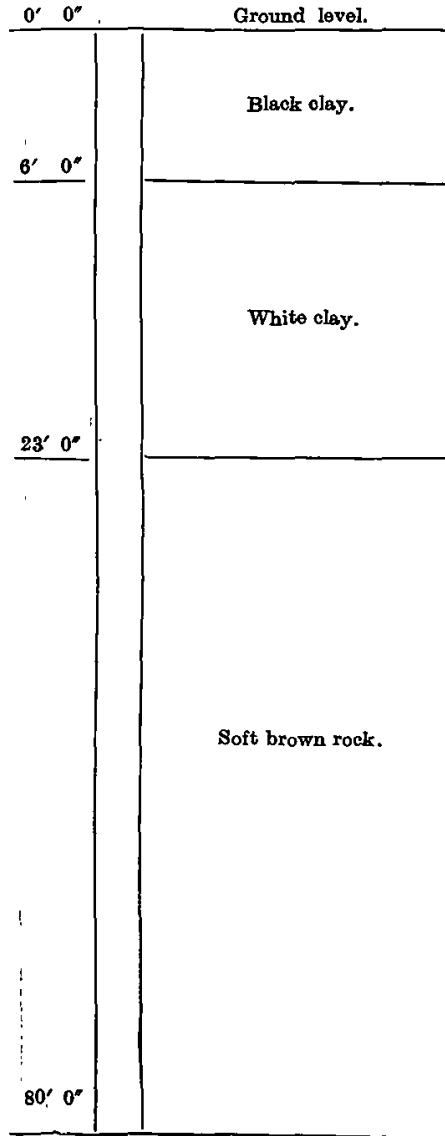
Taluk—Trichinopoly.

Village—Sembattur.

Site of boring (survey number, etc.)—239.

Nearest railway station—

Name of the party—N. M. Kajamyam Rowther.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN

District—Trichinopoly.

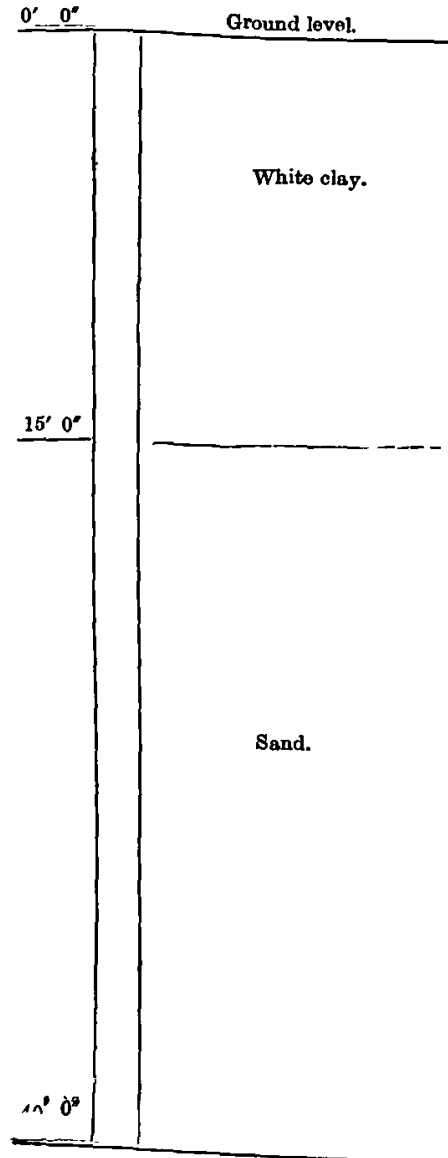
Taluk—Trichinopoly.

Village—Kavatharasanallur.

Site of boring (survey number, etc.)—70.

Nearest railway station—

Name of the party—Superintending Engineer, Tanjore Circle.



CERAMIC SURVEY,

SKETCH OF BOREHOLE PUT DOWN.

District—Vizagapatam.

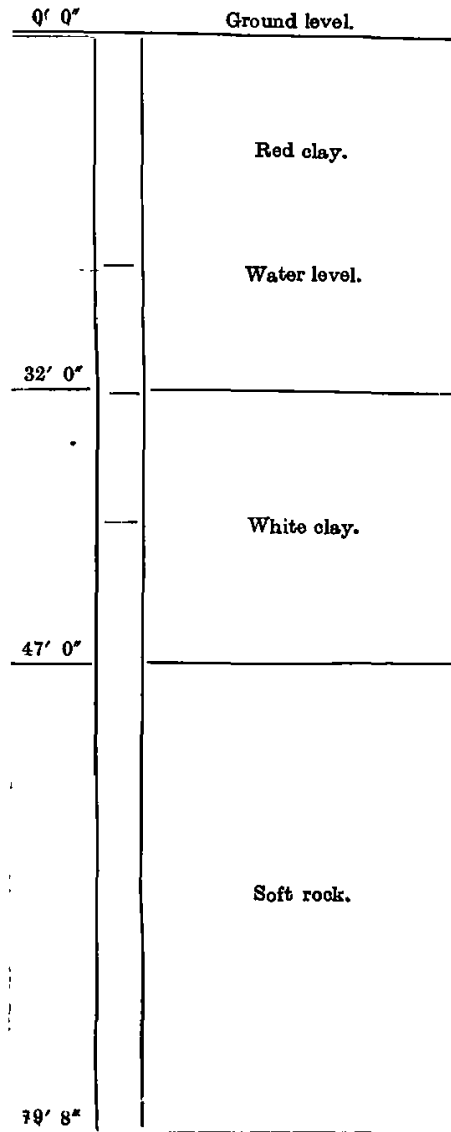
Taluk—Anakapalle.

Village—Boilkuntada.

Site of boring (Survey number, etc.)—

Nearest railway station—

Name of the party—Mr. V. Ranganayakulu Nayudu.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Vizagapatam.

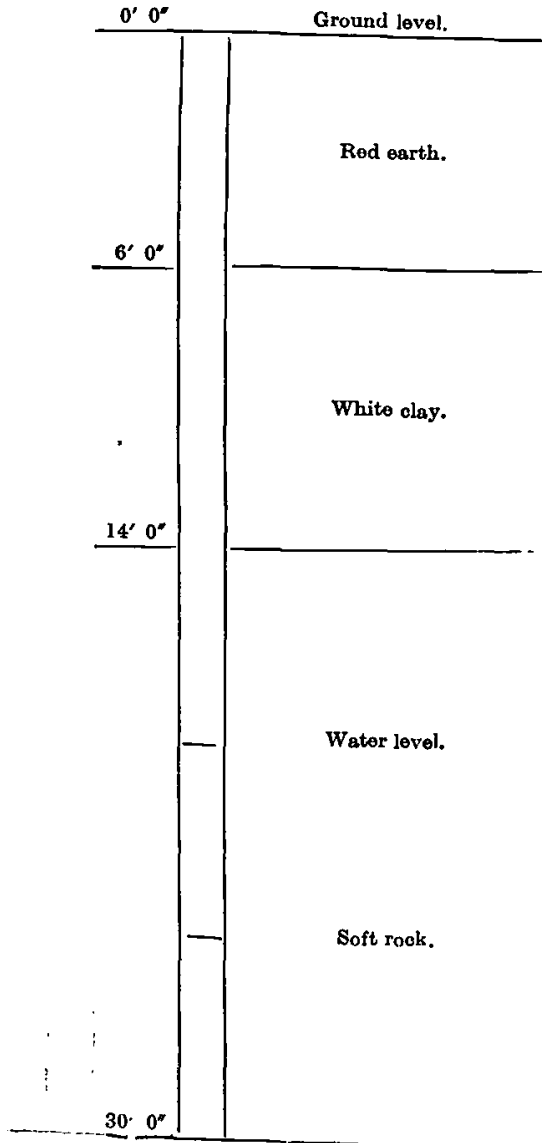
Taluk—Golugonda.

Village—Pamulavaka.

Site of boring (survey number, etc.)—126.

Nearest railway station—

Name of the party—Killadi Ramamoorthi Nayudu.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Vizagapatam.

Taluk—Sarvasiddhi.

Village—Ettikoppaka.

Site of boring (survey number, etc.)

Nearest railway station—

Name of the party—Mr. Appala Raju.

	0' 0"	Ground level.
	4' 0"	Clay.
		Gravel.
	28' 0"	
	30' 0"	Rock.
		Laterite soil.
	43' 0"	
		Soft stone.
	53' 0"	
		Yellow clay.
Water level.	60' 0"	
	67' 0"	White clay.
		Clay.
	75' 0"	
	80' 0"	Gravel.
	84' 0"	White clay.
	90' 0"	Gravel.
		Clay and gravel.
	100' 0"	

CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN,

District—Vizagapatam.

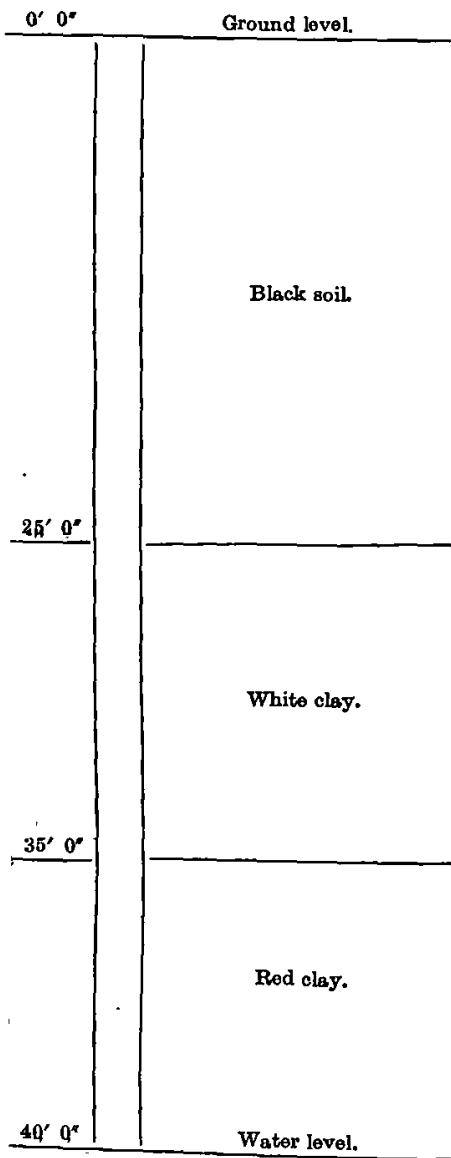
Taluk—Sarvasiddhi.

Village—Koruprolu.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—Mr. Kusumanji Jogi.



CERAMIC SURVEY.

SKETCH OF BOREHOLE FOR DOWN.

District—Vizagapatam.

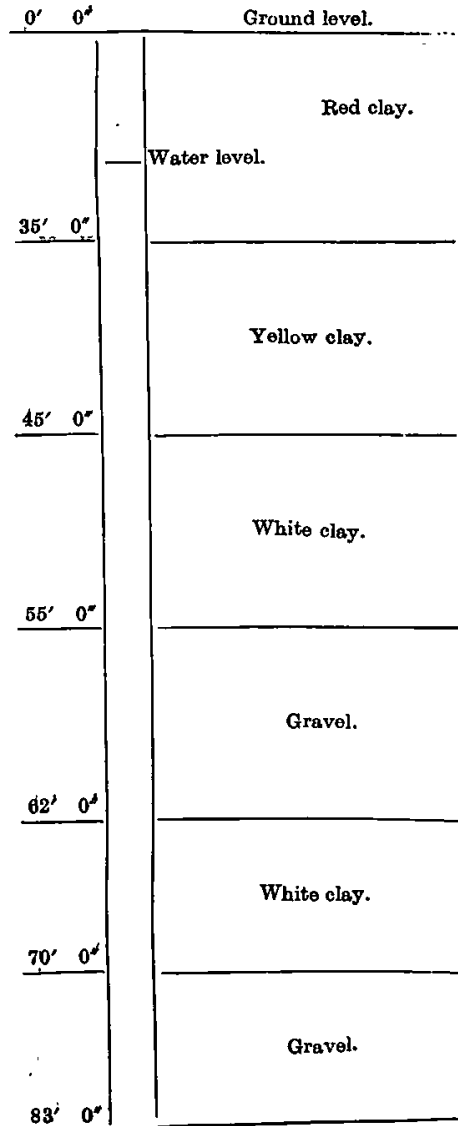
Taluk—Sarvasiddhi.

Village—Bappanapet.

Site of boring (survey number, etc.)—

Nearest railway station—

Name of the party—Mr. Chouday Appa Rao.



CERAMIC SURVEY.

SKETCH OF BOREHOLE PUT DOWN.

District—Vizagapatam.

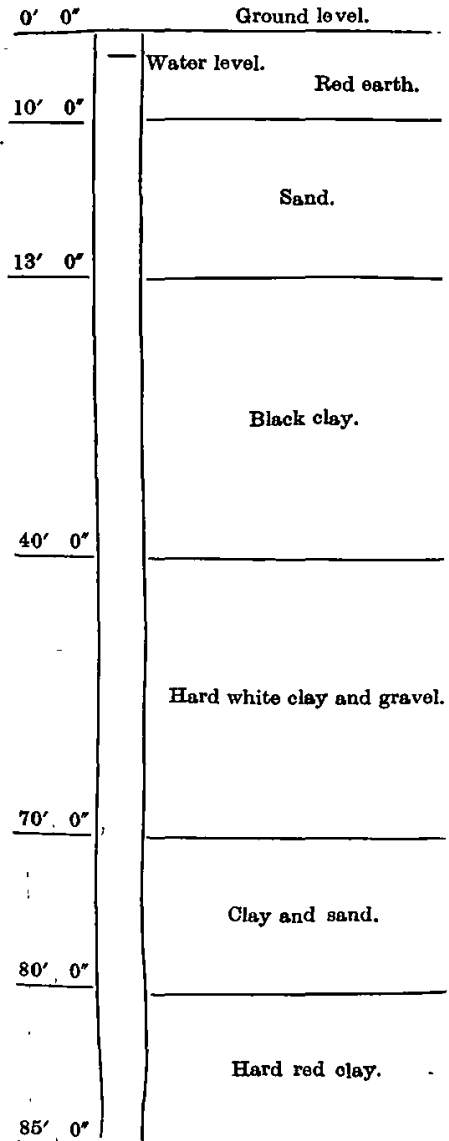
Taluk—Sarvasiddhi.

Village—Koruprolu.

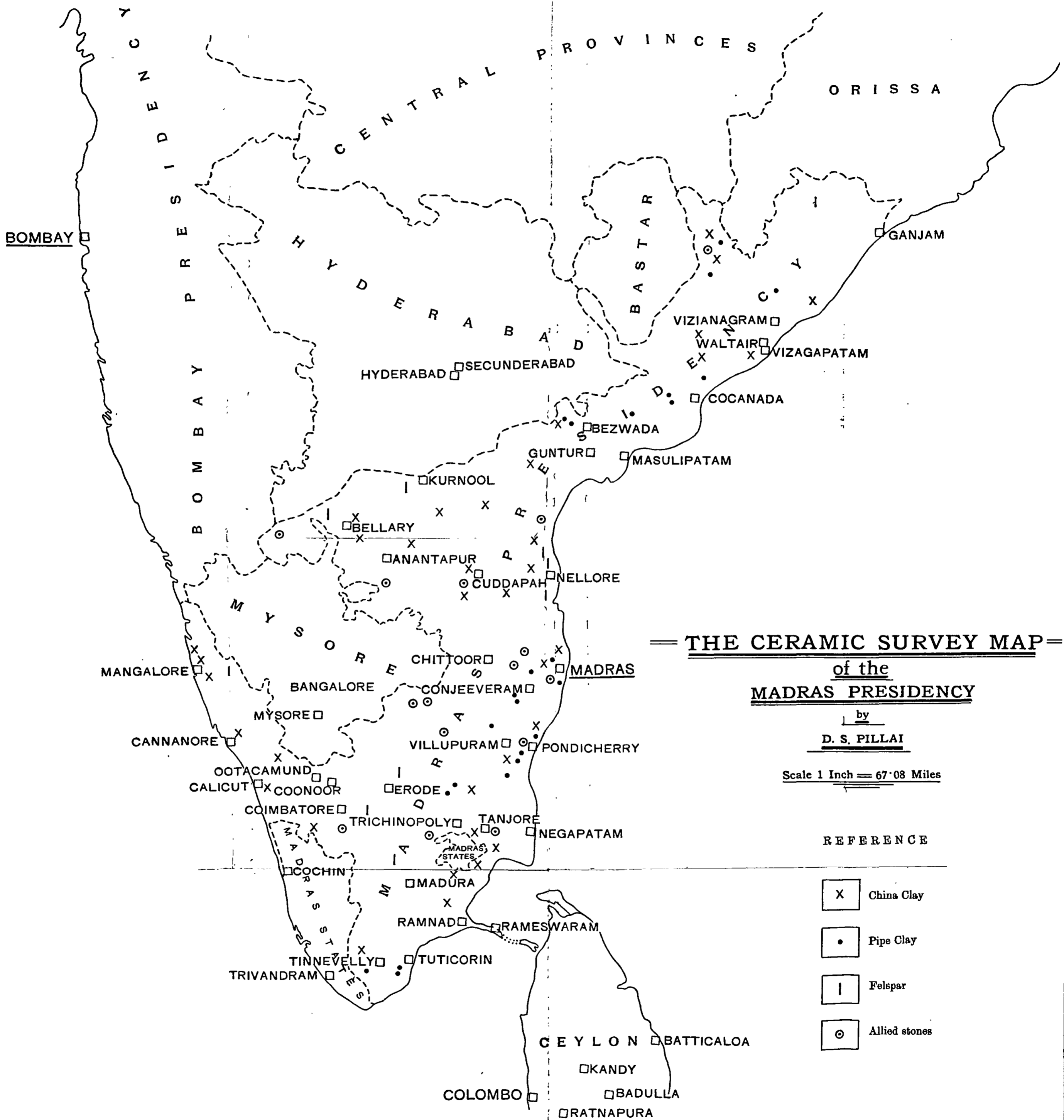
Site of boring (Survey number, etc.)—

Nearest railway station—

Name of the party—Mr. V. Lakshminarasimham.



APPENDIX - E



Government of Madras

DEVELOPMENT DEPARTMENT

G.O. No. 1468, 4th December 1933

Industries—Ceramic survey—Report of the Ceramic Expert—
Published.

READ—the following papers :—

I

- G.O. Ms. No. 703, Development, dated 1st April 1930.
- G.O. Ms. No. 836, Development, dated 2nd June 1931.
- G.O. Ms. No. 618, Development, dated 4th May 1932.
- From the Director of Industries, dated 5th January 1933,
No. 112-A/32.
- From the Director of Industries, dated 10th January 1933,
No. 112-A/32.
- From the Director of Industries, dated 27th January 1933,
No. 112-A/32.

II

Letter from V. RAMAKRISHNA, Esq., M.A., I.C.S., Director of
Industries, to the Secretary to Government, Develop-
ment Department, dated Madras, the 28th June 1933,
No. 662-A/33.

[*Reference.*—Government Memorandum No. 102-II/33-2,
dated 6th June 1933.]

I forward herewith the final report on the ceramic survey of
the Madras Presidency submitted by the late Ceramic Assistant.

Order—No. 1468, Development, dated 4th December 1933.

The Government direct that the report prepared by the Ceramic
Expert on the ceramic survey of the Presidency conducted by him
shall be published.

(By order of the Government, Ministry of Education and Excise)

C. A. HENDERSON,
Secretary to Government.