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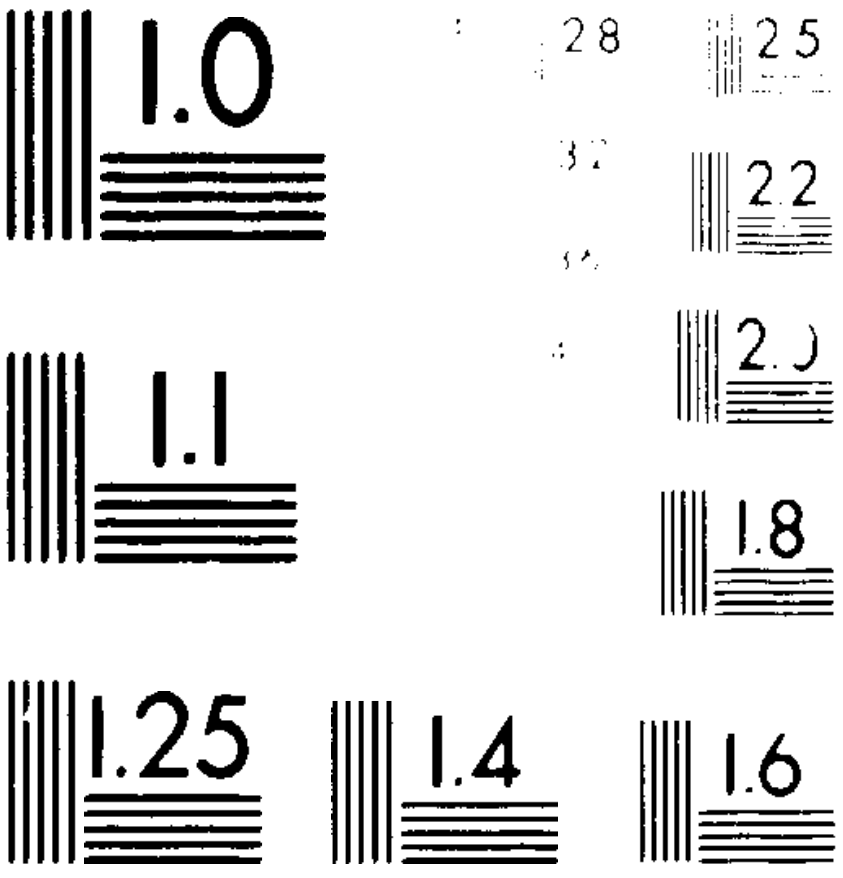

→ M. Dietrich

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2 January 1985
ENGLISH

Sri Lanka.

ESTABLISHMENT OF A CERAMIC RESEARCH AND DEVELOPMENT LABORATORY

US/SRL/7?/207

SRI LANKA

Technical Report *

Prepared for the Government of Sri Lanka
by the United Nations Industrial Development Organization
acting as Executing Agency for the United Nations Development Programme

Based on the work of Mr. F. von Metzsch,
Expert in Installation, Use and Maintenance
of Ceramic Laboratory Equipment

United Nations Industrial Development Organization
Vienna

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ABSTRACT

On request of the Government of Sri Lanka UNIDO formulated the project
"Establishment of a Ceramic Research and Development Laboratory".
The project was given effect by 1.13 million US$ support by the Federal Republic of Germany and was started and is now executed by UNIDO in co-operation with the Ceylon Ceramics Corporation.

The purchase of equipment based on proposals of Ceylon Ceramics Corporation was started by UNIDO in 1983.
The project execution in Sri Lanka began early in January 1984.

After provision was made for security, necessary concrete work, electricity and water supply in an existing building in the Piliyandala factory of the Corporation, the installation of more than 130 equipment items from 33 suppliers was done step by step.
On the occasion of a ceremonial opening on the 18th September 84 about 100 equipment items were installed and working.

This report covers the time of my duty, e.g. 27.3. - 31.10.84

- o the preparatory work before installation of equipment
- o the installation of equipment
- o the training of personnel
- o the setting up of laboratory organization
- o the setting-up of quality control system and
- o the settlement of internal and external orders.

Furthermore, is given a survey about pending installation work and recommendation of topics to which should be paid attention for the continuation of project and operation of the laboratory.

This report is harmonized with project Chief Adviser, Prof.Y.Kato and Ceylon Ceramics Corporation but not yet with UNIDO headquarters.

CONTENTS of this REPORT

1. Introduction

The idea of establishing a Ceramic Research Laboratory in Sri Lanka came from Mr. Sri Pathma, former General Manager, Ceylon Ceramics Corporation. Dr. Bandula Perera, present General Manager, promoted such establishment. His ideas were fundamental for the actual performance of the project, since he had ordered about 70 % of equipment before experts were invited to come.

All experts of the project were at an advantage as there was always an interested and active counterpart. Proposals of experts were always considered and most of them were accepted by management. All decisions could be made in agreement and harmony. So we could overcome all difficulties.

I am personally obliged to Chairman, Mr. John Sebastian, Dr. Bandula Perera, General Manager and all members of the management of the Ceylon Ceramics Corporation and its factories for willingly giving their assistance and help to make the venture of the Ceramic Research Laboratory a success.

Chief Adviser for the project from January to December 1984 was Professor Yoshimori Kato. I have to thank him for the excellent co-operation given to me, while he took care of quality control problems in the factories, I could concentrate on my work, on installation of equipment and laboratory organization.

Sri Lanka is a country with ceramic tradition. Bricks and roof tiles were fired - without interruptions to be mentioned - since 2500 year Besides the 24 factories of the state owned Ceylon Ceramics Corpration, there exist a number of ceramic factories belonging to small industries and numerous private potteries.

The deposits of China clay, Ball clay, Feldspar, Quartzite, Calcite, Dolomite and even Wollastonite secure the basis for ceramic production of any kind.

But not only ceramic raw materials and products but also the domest deposits of commercial minerals, as Ilmenite, Rutile, Zircon and Monazite and the various Gemstones make a laboratory for investigation of such material useful.

The number of customers and the large number of orders given in the last few weeks to the new laboratory proves the need for such a laboratory and justifies the project.

2. Preparatory Work before Installation

For the location of the laboratory various places were taken into consideration. On advice of Mr. Kato in January 1984, the decision was made to install the laboratory in an almost empty two storied building with 12 rooms within the premises of the Ceylon Ceramics Corporation factory at Piliyandala (20 km SSE of Colombo Fort).

This decision was important and the best, since other proposals would have caused further delay, by the need of construction work.
The renovation of the old, empty building and the installation of energy took 5 1/2 months. However, while the renovation was being done room by room, we could proceed with the laboratory work at any time at least in one of the 12 rooms.

Based on the proposals of the Corporation, equipment with a value of about US$ 450,000 was ordered by UNIDO in 1983. Some consignments came in December 1983, before the decision was made where to install the laboratory. Thus they were sent to various places.
However, reviewing, we have found that none of the defects detected in some of the displaced equipment items seems to be due to the storage between December and April.

When studying the list of ordered items at home in Germany it was understood that the missing parts are in possession of Corporation or could be purchased at the local market. Contrary to expectations there were only a few of the necessary installation material available from stock of the Corporation. The workshop available was sufficient for the factory but not for precision mechanic items of laboratory. Screws and tubes, water taps and hoses, electrical plugs and sockets had to be personally purchased by experts, since the practice of the purchase department of the corporation turned out as not suitable for the particular needs of a laboratory.

For the completion of the laboratory functions purchase of further items were requested by experts in March. Due to delayed quotation of suppliers these items with the value of about US$ 100,000 could be ordered by UNIDO not before Mai 1984.

During installation work missing links were discovered. The quotations and/or the shipments of some suppliers turned out to be not complete for starting work. The missing parts were purchased on the local market or ordered by Field Purchase Orders.

3. Installation of Equipment

The installation of equipment was done according to a plan and with regard to the following subdivision:

Room no 1: X-ray and thermoanalysis
2: Mineralogical laboratory with electron microscope
3: Sample preparation and workshop
4: Store room
5: Body preparation (mills and filterpress) } Pilot Plant
6: Forming room (presses, moulds, Jigger) } Pilot Plant
7: Glazing and firing. Kiln room
8: Physical Laboratory, Material testing
8a Designers corner
9: Balance room
10: Chemical Laboratory
11: Conference room (lecture room)
12: Office

Installation was understood not only as setting up and connecting to current (and water), but checking of functions and use for work.

Annex A shows the actual inventory list of equipment which arrived at laboratory until October 22nd, 1984

Some of the equipment showed defects. These defects are explained in Annex D.

The equipment which is expected still to come is listed in Annex E.

4. Responsibility for equipment

The allotment of each equipment to a certain room was taken as basis for responsibility. One research officer assigned to the respective room is responsible for all questions of use and maintenance of the equipment in his room and reports weekly (see 5.)

5. Use and Maintenance of Equipment

The responsible research officers make a weekly report on
Use / not use
Function / non function
Availability / non availability of equipment

By this report they have to check whether the equipment not used is ready to work and whether all parts of the equipment and the tools are in their room in custody.
The research officers have got orders from General Manager to give written notice about any defect which they cannot overcome within 3 days after detection and to give notice by writing in time for any need in consumption material or spare parts.

This weekly report shows to be practical and is accepted in its importance by the responsible officers.

Annex W shows such weekly report.

6. Personnel

The selection of research officers began late in April from about 100 applicants. Since June the laboratory is operated by a staff of 11 research officers and 1 designer. Since September the laboratory administration is performed by 1 secretary.

The personnel was attached to the rooms as follows:

Room 1: Ranathunga, Sirithunga
Room 2: Karunasinghe — 1 vacancy
Room 3: — 1 vacancy
Room 4: (Store room)
Room 5 and 6: Alles, Jayakody
Room 7: Silva (Glazing)
Dharmasiri, Mitherathne
Room 8: Pannila — 1 vacancy
8a: Mrs. Hemalatha (designer)
Room 9 and 10: Miss Pigera, K.A.N. Dharmasiri
Room 11: (conference room)
Room 12: Mrs. Perera (secretary)

The vacancy in room 2 was caused by a selected person who did not co
The technical officer for the workshop was not yet selected which is an unfortunate handicap.

The number of personnel is scarcely sufficient for the expected number of orders. The function of laboratory will not be satisfactory when some of the officers will leave for training if no completion has been arranged in time.

The main vancancy is the head of the laboratory. However, it seems to be very probable that Dr. Bandula Perera, General Manager of Ceylon Ceramics Corporation, will be assigned to this function after the experts leave.

7. Training of Personnel

Training of personnel was begun in June for members of laboratory staff (see 6.) and for selected officers from factories. Mr. Kato held a weekly lecture about basic ceramic knowledge and in addition, for factory officers only, two weekly lectures with respect to production problems.

My weekly lecture was a treatise on testing principles and all kind of laboratory methods. Main target was the training of the staff in the use of equipment and the practical performance of investigations. Great emphasis was laid on the reports about results and findings.

To compare the practice of methods one officer of the chemical laboratory was sent to another laboratory in Colombo, further exchange of experience has been arranged.

The training of the staff members outside Sri Lanka remains still in the planning stage. Therefore it cannot be included in this report.

8. Laboratory Method Specifications

For the routine investigations used in the laboratory "Laboratory Method Specifications" have been established in respect of the installed equipmenmt and with regard to European and Sri Lankan Standards. The research officers have to refer for each result to the specification used. Annex S 1, 2 and 3 shows the pattern of such specifications.

These specifications are not yet complete, because to develop the most suitable method, takes time. Almost 50 Standard Method Specifications have been established, checked and accepted. I expect the laboratory to have in a final stage about 80 such standard methods according to the number of services offered to customers as shown in Annex O.

9. Special Regulations

- o It was agreed to use metric units only, as fixed by ISO.
- o All results of more than 5 equal samples have to be evaluated in respect of the rules of statistics, mentioning with the result number of samples (n), average ($\bar{x}$) and standard deviation (s).
- o If 2 properties have been investigated and more than 9 pairs of values are available, regression analysis is to be made.

  A suitable (pocket-) computer for such calculations was added to the equipment.

10. Offer of Services

By September the laboratory could start to offer very many services to prospective customers. A list of offered investigation methods is shown in Annex O. To give this information to prospective customers and to explore the demand for assistance by the new laboratory in the factories, I have made numerous visits. As a result of such visits and the contacts made by others, we have received in September and October many orders which will take the laboratory until end of the year, to complete.

11. Management of Orders

Much emphasis was laid on the organization of the laboratory for the acceptance of orders and correct defined samples and the delivery of results. As shown in the Annex F1 - F4 the following forms were printed:

F1 Letter head
F2 Customers order
F3 Acceptance of order and delivery of results
F4 Internal order (for research orders)

12. Quality Control System

A quality control agreement, first of its kind, was made with the Piliyandala factory. The factory hands over a sample of each raw material supply. Research laboratory will observe the change of properties in intermediates with regard to change of properties in raw materials. It will take time to make such quality control system efficient.

13. Contacts to Factories of Ceramics Corporation

To discuss matters of quality control and to explain the possibilities of the new laboratory I visited the following factories during my stay. In some cases I could give advice in the field mentioned.

26. 3.	Dankotuwa Porcelain (Pvt) Ltd. (control of moulds, cleaning)	Mr. Upali Rajapakse
26. 7.	(questions of decoration)	FM Daya Nissanka
28.3.	Borelesgamuwa Kaolin Factory	
3.7. 19. 8.	Negombo Crockery & Sanitary ware Factory (plasticity control, manufacture of dies, production of porcelain pebbles, export of telephone insulators)	Mr. Kuruppu FM Lal B. Samarasekera QA Eleric Fernando
9. 7.	Owela Feldspar Quarry (assistance of laboratory for control of melting properties)	OIC de Silva
9. 7.	Lanka Porcelain (Pvt.) Ltd. Matale	GM Premasiri Kongahage FM Dayaweera/QCO S.Chandra AFM Mano Wickremaratna
10. 8.	Weuda Brick & Tile Factory (control of raw material)	PM Premavansa (Piliyandala FM Videsiri
27. 7.	Lanka Refractories (Pvt.) Ltd. , Meepe (improvement of records for quality control)	DGM Kularathna PM Soisa APM Peris AFM Disanayke QA Miss Pardo
21. 9.	Elayapattuwa Brick & Tile Factory (control of raw material)	FM I.B. Weerasekera
1.10.	Hungama Lime Plant (certificate of quality)	FM Wijenayake AFM Regus
1.10	Uswewa Brick & Tile Factory (improvement of drying procedure: first at 100% humidity with full heat, then dropping humidity)	FM B.L.S. Chandrasena QA I.A. Ananda
19.10.	Dediyawela Ball Clay Factory (installation of quality control at factory)	OIC Chandrasena

14. Contacts to prospective Customers outside Ceramics Corporation

Sri Lanka Institute of Standards (to harmonize laboratory method specifications with Sri Lankan standards)	Dr.N.R. de Silva, Director genera
Geological Survey Department (for exchange of experiences and information. 2 research officers stayed already for half days in the laboratories of this department. One will be trained in cutting slides)	L.K. Senevirathne, Director O.C. Wickramasinghe, Chief Chemis
Mineral Sands Corporation (establishment of a quality control programme for supervision of the separation of the Pulmoddai mineral sands)	R.S. Sirisena, Chairman Thiyakeradjah, Marketing Man S.A. Nandadewa, GM, Pulmoddai Anthony Paul, Chief Chemist, Pulm Dr. Hans Portisch UNIDO Expert
University of Moratuwa (general cooperation, use of library, service of printing dept.	Prof. Ayal De S. Jayatilaka Dr. Mohan J. Edirisinghe Lal Fernando
Hemas (Drugs) (supply of porcelain ware by Ceramil Research Laboratory)	M.H. Esufally, Director

15. Recommendations for the Laboratory

a) Defects of items as listed in Annex D should be overcome with the help of supplier or manufacturer.

b) Installation of expected 12 items of equipment have to be done.

c) After settling the defects or installation of a new eqipment an internal laboratory order should be given for the evaluation of working rules and method specifications.

d) All research officers should be reminded from time to time to study characteristics, possibilities and deviations from theoretical value in their equipment and the methods used.

e) All research officers should be guided to deliver considerate results, to collect data of related materials, to compare and to make conclusions

f) All research officers should be strictly guided to fulfill the special regulations, as mentioned in paragraph 8. and 9.

g) For methods used which or not yet specified the respective research officer should be asked to formulate the Laboratory Method Specification.

h) Reports about results and special investigations should be elaborated by research officers with great care, accuracy and responsibility. This should be a topic for further training.

i) To prove accuracy of laboratory work, I recommend to give from time to time order to investigate well known substances.

j) I recommend the installation of a meter for current consumption and monthly report about such consumption.

k) Laboratory should not report about quality figures of any factory or customer to anyone, except to the factory (customer) itself. All questions about quality of a certain product - even from chairman - should be in principle answered by respective factory - ofcourse on basis of results of Research Laboratory.

l) Exchange of information between research officers (in the field of their activities) and customers should be broad. Everyone should look for a good relationship.

m) The calculation of time for accomplishing the various laboratory method specifications is not yet ready. The research officers should be asked for this information .
A rough estimate shows that a laboratory man hour costs about 75 - 100 Rs. Loss on Ignition, for example, can be done 30 times a week, e.g. within 40 hours. One sample needs accordingly 1.33 hours. Multiplied with the costs of 75 Rs/h, for one LoI should be accounted 100 Rs.
The billing rates for all standard operations should be fixed until 15.3.1985, e.g. before expiration of the free-of-charge-tim

n) Laboratory Method Specifications should be sent in copy to Sri Lanka Institute of Standards "for information"

o) The arrival of samples of Mineral Sands Corporation, Pulmoddai has to be immediately stated by a short letter to head office and to Pulmoddai factory.

p) Hemas (Drugs) expects a quotation as soon as laboratory is able and interested to manufacture porcelain crucibles etc.

16. Recommendations for the Continuation of the Project

a) The project needs guidance for at least further 14 month, till end of 1985. This guidance is necessary to maintain the recommendations 15 a - k and for the start and performance of development and research work.

b) Such guidance seems to me also necessary to make quality control efficient.

c) Most important seems tc me now the motivation for research work and the supervision of it. The staff of research officers is young and unexperienced in this field. They need a "Doktorvater" e.g. a scientific man in the field of the particular research field who can give stimulation and censure as well.

d) I have proposed to invite young scientists from Germany or Austria to work on a subject of their interest in the Ceramic Research Laboratory. Such invitation could prcbably be supported by an United Nations programme. In this way the laboratory could get highly qualified research men who could not be hired by Corporation in Sri Lanka because of salary limits. Unfortunately Corporation has not yet requested such invitation.

e) The mentioned guidances can be given by many persons, for instanc for c) by professors of Sri Lankan universities. However, one expert should be responsible for the coordination within the project. Such coordination has the character of long term agreements. The daily coordination can be observed by the management of Corporation. The long-term co-ordination could be managed also in spite of an intermittent presence of the co-ordinator expert.

17. Recommendations to Ceylon Ceramics Corporation

a) For 1985 and the following years a budget of at least 100.000.- Rs + salaries is necessary to operate all laboratory functions.

b) The budget for the laboratory should enable the head of the laboratory to decide about purchase of any consumption material or about repair cost without limitation and for investments up to 5000.- Rs.

c) Because of non function of purchase department for the particular items instrumental in a research laboratory, the research officers should be entitled to make small purchases for the room and the equipment they are responsible for. They should be refunded within 24 hours without any complication on submission of receipt.

d) The number of personnel should be increased by 8 employees. Besides the 3 vacancies there should be trained further research officers, beside the research officers who will be sent abroad for training. In particular there is a need
in X-ray room for a man skilled in electronics and technical work
in the physical laboratory a technician to do the large amount of routine testing
in the pilot plant an experienced man (or girl) for handthrowing
an experienced man (or girl) for glaze develop

e) The efficiency of the laboratory should be controlled by Corporation management by request for
- o monthly report of use and maintenace of the equipment
- o monthly report of number of orders recieved and number of orders settled
- o submission of papers aboutan investigation of a particular subject by each of the research officers - at least once a year.

f) Invitation of foreign scientists to execute the research work of their own with the assistance of the Ceramic Research Laborato: (see 16 e)

Inventory of Equipment

ANNEX A

Room	Inv.No.	Item
1	P 1	Zephir - Cooler
	P 2	X- Ray Diffractometer PW 1710
	P 3	X - Ray Spectrometer PW 1410/50
	P 4	Hewlett Packard Computer HP 85
	P 5	On-Line-Recorder for Diffractometer
	P 6	Argon-Methane Cylinder 1
	P 7	Argon-Methane Cylinder 2
	P 8	Helium Gas Cylinder
	S11	Vibratom Mill
	M 1	STA Unit
	N 2	Measuring unit
	N 3	Differential Dilatometer
	N 4	Thermostat for STA
	N 5	Thermostat for Dilatometer
	M 3	Test Piece Extruder
	O 3	Drying Oven
	U 1	Air Conditioner, Window Type
	o	Desiccator
	o	Humidity Control (brit.)
	o	Humidity Control (japan.)
2	J 4	Electron Microscope *
	J 5	Photo Equipment *
	S 4	Stereo Microscope
	F 3	Polarizing Microscope
	F 4	Refractive Index Liquid Set
	K 2	Micrometer Dispensing Device
	M18	Mohs Hardness Set (6 - 9)
	U 2	Air Conditioner, Window Type
	o	Desiccator
	o	Microscopic Slides
	o	Mineral Collection
3	J 3	Microtome
	S12	Grinding and Polishing Machine
	B10	Lathe
	N 6	Stone Sawing Machine with 2 Diamond Wheels
4	U 5	Air Conditioner, Split Type
	M 8	Green Bending Strength Tester acc. to BCRA
	B 3	Muller Mixer
5	A 1	Sliding Scale Platform Balance 150 kg
	N13	Ball Mill 100 ltr (Netzsch) *
	o	Ball Mill 100 ltr (Negombo)
	I 1	Jaw Crusher *
	I 2	High Speed Sample Grinder *
	B 8	Jar Mill 9" with 6 Jars
	B 9	Jar Mill 11" with 6 Jars
	B ?	Muller Mixer
	O 5	OSK Pot Mill with 15 cm Jar
	F 1	Norton Jar Mill
	F 2	Norton Jar Mill
	N 7	High Speed Stirrer
	N 8	Filter Press with 14 Filterplates
	S13	Hydrometer (0-60 g/ltr)
	o	3 Aluminium Tubs
	o	3 Plastic Tubs *

*) = not yet arrived

Room	Inv.No.	Item
6	M 1	Large Drying Box with Fan
	M 2	Small Drying Oven
	H 1	De-airing Extrusion Machine
	C 1	Handoperated Hydraulic Press
	I 3	Handthrowing Machine *
	I 4	Handthrowing Machine *
	I 5	Jigger Machine *
	I 6	Jigger Machine *
	S 5+5a	IR Quick Drier with Balance 480 g
	S 8	Platform Balance 11ooo g
	M 9	Penetrometer for Testing non-plastic Surfaces
	B 4	Clay Hardness Tester
	M 4	Test Piece Extruder
	M 6	Green Bending Strength Tester
	o	Pfefferkorn Apparatus
	G 1	Gallenkamp Universal Torsion Viscosimeter
	o	Meat Mincer
7	S 9	Platform Balance 11ooo g
	G 3	Stirrer Handilab Minor
	S14	Hydrometer (0-60g/1tr)
	N 9	Spraying Box
	A 2	Compressor and Spraying Gun
	O 4	OSK Drying Oven
	M13	Glaze Thickness Tester
	K 1	Gradient Kiln
	N10	Naber Super Kanthal Kiln
	N11	Large Naber Kiln
	B11	Bickley PCE Furnace
	I 7	Gas Kiln *
	I 8	Gas Kiln *
	W 1	Seger Cones
	O 9	Oxygen Cylinder with Valve
	B 6	Bullers Ring Gauge
	B 7	Bullers Ring Gauge
	C 2	Filament Pyrometer
	J 1	6 - Channel Printing Recorder
	O 6	Calibrator for Thermocouples
	O 7	Potentiometer with Temperatur Display
	O 8	Potentiometer with Temperatur Display
	R 3	DC Microvoltmeter
	R 4	System Voltmeter UDS 6
	R 5	High Voltage Tester UHP
	B 1	Autoclave
	o	Chain Block *
	K 3	Adiabatic Calorimeter JPB
8	C 2	OSK Drying Oven
	R 1	Retsch Agate Mortar Grinder
	R 2	Sieving Machine Retsch Vibro
	O 4	Stirrer Handilab Minor with 3 Rotors
	S15	Hydrometer (0-60 g/1tr)
	K 4	Thermostat (8 1tr/min)
	K 5	Permeability Meter
	K 6	Andreasen Sedimentation Apparatus
	K 7	Andreasen Sedimentation Apparatus
	S16	Sedimentograph *
	S17	Sedimentograph *

* = not yet delivered

Room	Inv.No.	Item
8	K 8	Vernier Caliper
cont.	M 5	Test Piece Extruder
	M 7	Green Bending Strength Tester acc. to BCRA
	N12	Bending Strength Tester Netzsch
	T 1	Bending Strength Tester TONI
	C 6	Sample Splitter
	B14	Brockfield Viscosimeter
	G 6	Redwood Viscosimeter
	G 2	Gallenkamp Universal Torsion Viscosimeter
	M14	Moisture Expansion Measuring Device
	S 6+6a	IR Quick Drier with Balance 480 g
	S10	Platform Balance 12ooo g
	L 1	Colorimeter LF 90 with Measuring Head
	M16	Cannon Statistic Calculator
	M10	Needle Penetrometer for Testing non-plastic Surfaces
	M11	Needle Penetrometer for Testing non-plastic Surfaces
	M12	Thickness Tester
	M13	Thickness Tester
	G 8	Multi Test Tube Drier
9	S16	Analytical Balance 2024 MP 6
	S17	Platform Balance 12ooo g
	S 7+7a	IR Quick Drier with Balance 480 g
	C 5	Centrifuge Rotanta
	T 2	pH Meter TPS
	M14	Ion sensitive Electrodes Pb & F with Ag/AgCl-Electrode
	B12	Magnetic Stirrer
	H 2	6 Platinum Crucibles g
		2 Pt/Au Moulds g
		3 Platinum Dishes g
		6 Nickel Crucibles
	K12	Orsat Apparatus
10	C 3	Crucible Furnace Simon Muller
	C 4	Crucible Furnace Simon Muller
	O 1	OSK Drying Oven
	G 5	Stirrer Handilab Minor with 3 Rotors
	F 5	Vacuum Pump
	B13	Digital Vacuum Meter *
	B14	Mercuri Vacuum Meter *
	L 2	Water Distillation Plant
	G 9	Multi Test Tube Drier
	G10	Multi Test Tube Drier
	o	Glassware
	o	Chemicals
11	U 3	Air Conditioner Split Type
	L 4	Magic Board
	M15	Overhead Projector
12	E 1	Electrical Typewriter Olympia
	U 5	U-BIX Copier
	H 3	Vacuum Cleaner Hoover
Library	L 5	Mackenzie: Thermoanalysis
	L 6	Singer: Industrial Ceramics
Carpark	N 13	Nissan Jeep

* = not yet delivered

The copies no 9 of purchase orders of the following purchase orders have been forwarded to PAC, Vienna:

15-3-E0802
15-3-E0937
15-4-E0476 on 3.9.1984 from Colombo

15-4-E0489
15-3-1354 on 5. 9. 1984 from Colombo

15-3-E0218
15-3-E0757
15-3-E0766
15-3-E0767
15-3-E0794
15-3-E0795
15-3-E0786
15-3-E0814
15-3-E0869
15-3-E0932
15-3-E0942
15-3-E0971
15-3-E1329
15-3-E1005
15-3-E1330
15-3-E1331
15-3-E1332
15-3-E1333
15-3-E1354

15-4-E0481
15-4-E0714
15-4-E0749 on 5./6. 11. 1984 in Vienna

For all these consignments the respective receipt can be given to UNDP Colombo.

For all not mentioned purchase orders (for which the copy no 9 is missing) it will be sufficient to give a receipt to UNDP Colombo.

Kind regards

F. A. Metzsch

CERAMIC RESEARCH LABORATORY

established by
United Nations Industrial Development Organization (UNIDO)
and Ceylon Ceramics Corporation

The following Equipment could not yet be used:

1. Sartorius analytical balance (PO no 15-3-E0804)arrived highly corroded and is still in repair at agent's workshop in Colombo.

2. Permeabilitymeter (PO no 15-3-E0945) was ordered without sample holder. Sample holder was meanwhile ordered by Field Purchase Order 005779 but did not yet arrive.

3. Grinding and polishing machine was delivered without grinding wheel. Complaint was made to the supplier (PO no 15-3-E0945).

4. Boley lathe (PO no 15-3-E0704) was ordered without collars, chucks and cutting tools. We are waiting for quotation for the tools.

5. Philips X-Ray spectrometer arrived highly corroded (because of unsatisfactory packing without drying agent and without sealing plastic foil). The repair or replacement by Messrs Philips was not yet accomplished. We expect the parts to arrive here in November They will be properly installed by Mr.Meyeringh, Philips service engineer. (PO no 15-3-E0971)

6. System voltmeter USD 6 has a defect which we can settle only if supplier provides us with service manual. (PO no 15-3-E0752)

7. The thermocouple calibrator (PO no 15-3-E0767) shows no figures on the display.It will be sentto the supplier for repair..

8. The autoclave (PO no 15-3-1354) has a very heavy lid. To open it we need a chain block which is not yet installed.

9. The PCE-furnace will be started by an installation engineer of the manufacturer. We are awaiting proposal of schedule. (PO nc 15-3-E0801)

10. STA (PO no 15-3-E1005) is installed. However we will order the assistance of an installation and application engineer of the supplier.

CERAMIC RESEARCH LABORATORY

established by
United Nations Industrial Development Organization (UNIDO)
and Ceylon Ceramics Corporation

Equipment which did not arrive yet : (29.10.1984)

Supplier	Item	for room no.
Isekyu	Jaw crusher	5
	Sample grinder	5
	2 Hand throwing machines	6
	2 Jigger machines	6
	2 Gas kilns	7
Jeol	Electron microscope	2
	Photo equipment thereto	2
Netzsch	100 ltr ball mill	5
Philips	Interface and Printer KSB 34	1
Shimadzu	2 Sedimentographs	8

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Dr. F.A. von Metzsch

Piliyandala

24. 10. 1984

To Chairman
Ceylon Ceramics Corporation

During my yesterday's report I have given some recommandations as listed below in short terms.

A. Ceramic Research Laboratory

Control by number of settled orders per month, quarter or year
by quarterly or yearly report about use of equipment
by demand of one report by each of the research officers about one certain research subject a year.

Budget (without salaries) 1 mio rupees/year at least

Budget should provide petty cash for uncomplicated and quick purchase for items with value below 1000 Rs.

Personnel should be increased withregard to the number of orders t be settled and with regard to training programme by about 8 persons

Efficient administration is important for acceptance of orders delivery of results, control of use and maintenance of equipment, for purchase of specified laboratory items and for budget control

Research should be stimulated by invitation of foreign scientists to work in and with the laboratory.
Mr. Kurt Stuwe, an Austrien mineralogist (with German citizenship), now working on a geological problem in Alaska, agrees to come from January 1985 for 2 years as an volounteer to do research work (with much own ideas!) in the laboratory. Since there exists UN-Volonteer progra which is highly supported by Germany, a letter of demand from government of Sri Lanka to UNDP is necessary to star the invitation.

B. General recommandations for Corporation

Procurement of material could be improved. The knowledge about possibilities of supply and quality is low. This is not adequate to the fact that material costs show the highest figures in product calculations.

Catalogue or any specification list would be helpful for product planning and quality control

Communication would be improved by telex in Piliyandala. Telex is much cheaper than telephone for communication with the factories and laboratory.

contd./2

C. Ceramic Industry in Sri Lanka

There are only few countries with as good conditions for ceramic industry as Sri Lanka. To put some investments into improvement can therefore recommended.

The raw materials as China Clay, Ball Clay and Feldspar seem to be better than their reputation. However, quality control has to be done at the deposit.

It would be easy to develop the production of split tiles in the brick & tile factories. I would be able to give and procure some know how for this.

For the installation of a floor tile factory I am able to give some advise based on 20 years experience in production and planning of such factories.

Lanka Walltiles (Pvt.) Ltd. has a production of high quality. I do not see any reason to import wall tiles to Sri Lanka However some design work should be done - and then increase of capacity !

Mosaik needs development of new body, new glazes and designs. Masaik can be produced with much less energy consumption. With a flat kiln I suppose, the energy consumption can be dropped to 50%. Since I was in charge of the most modern mosaic factory in Europe, I could submit some know how.

It would be advanteageous not to produce refractories in various factories but in Meepe only. Meepe has to learn to meet the quality demands of Lanka Porcelain and Lanka Walltiles.

Meepe should learn to build kilns. It would pay to buy the know how or a licence. For what kind of kiln, I could submit some know how.