Report on Training of District Extensionists

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REPORT ON TRAINING OF

DISTRICT EXTENSIONISTS

SARVODAYA/CEB STOVE PROGRAMME

Kandy, Sri Lanka

9 - 23 August, 1985

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ABSTRACT

The two-week course included 10 students with all levels of stove experience from both CEB and Sarvodaya. The training goals were to impart sufficient technical background so the students could conduct supervision of all stage of production and evaluation of the 2-pot chimneyless installed "Sarvodaya" stove. Despite this ambitious objective, the training seemed to be successful in giving sufficient understanding in several key technical areas.

An additional two weeks was devoted to each of the CEB and Sarvodaya stove programmes for followup on their trainees.

Due to the brevity of the course, special care will be required by management to determine what each student's abilities are, and where additional training is required.

THE CONTEXT

The training was conducted by Mr. Lamasena of Sarvodaya and John Selker and Laurie Childers of ITDG, with lecture support by Mr. Bandara and Mr. Amerasekera of CEB Energy Unit, and John Loose of ITDG. Additionally, an introductory speech was given by Prof. K. K. Y. W. Perera, Secretary of the Ministry of Power and Energy, and a concluding speech was given by Mr. Sisira Navaratne, Division Field Officer for Sarvodaya.

Most activities took place at Sarvodaya District Center, Palletalawinna, Kandy. A small classroom was constructed just prior to the training, and the practice installations took place nearby. Several days were spent in nearby Wallala at a potter's house for demonstrations and practice in the construction of the pottery liners.

The most important factor in determining the focus of the training was the students' diverse backgrounds. Of the six students from the CEB, three were newly recruited staff who had never worked with ceramics or stoves; one had installed over 50 stoves, and two were potters with extensive experience. The four Sarvodaya students included two experienced stove installers, one stove producing potter, and one village health worker.

Language was a significant obstacle in the training. None of the students were fluent in English, so all lessons from the ITDG staff needed to be translated into Sinhalese. A Sarvodaya translator, Mr. Charles, was hired for this. Given the obscurity of the fields of stoves and ceramics, adequate translation was difficult to obtain. None of the Sinhalese lectures were fully translated for the ITDG staff.

GOALS

This training was directed towards resolving the key technical bottlenecks which have historically held up stove dissemination in Sri Lanka. Three areas were selected as particularly crucial and appropriate for this training: skills in working with potters, technical troubleshooting and evaluation, and understanding the issues and activities important to successful stove dissemination.

THE PROGRAMME (See Appendix 1, the Time Table)

Week 1

After introductions, and practical cooking on the 2 - pot stoves, the entire first week of the training was devoted to production issues surrounding the ceramic stove liner. The first day on ceramics was largely basic pottery theory background. The students were guided by first learning the key descriptive vocabulary of ceramics. The vocabulary was then placed into perspective by leading a discussion through the steps of production of a ceramic stove liner.

The next two days were spent working with a local stove-producing potter. After complete demonstrations by the potter, each student made one liner. The work was monitored by Mr. Lamasena and Mr. Bandara. Techniques of throwing, coiling, and slab rolling were demonstrated, but the students were directed to use coils for reasons of simplicity. In this society where the potters are of very low social standard, it was critical to get all of the students to work with the potters and with clay to break any social barriers gently but thoroughly.

On Friday of the first week, the overall subject of working with potters was discussed. Special note was made of the richness of the local pottery traditions, the expected stages in training a potter to produce the pottery liner, and the economics of pottery production. As three of the student were potters, the discussion produced particularly successful results. See Appendicies 2, 3, and 4 for lecture notes on ceramics, notes on working with potters, and pictoral demonstration of the use of templates.

Week 2

The second week was devoted to 3 subjects: stove evaluation; followup and dissemination; and installation practicals.

The stove evaluation section was aimed at enabling students to differentiate between serious and cosmetic errors in the liner and the completed stove. Each group of 2 - 3 students made measurements and observations of 2 stoves (see Appendix 5). Through this exercise, the students discussed and committed themselves on paper to judgements regarding each stove's strengths and faults. Subsequently each group conducted a water boiling test on both of the stoves. During the test

the students wrote qualitative observations about the stove's performance regarding expected efficiency, usability, and safety. The results of the tests were displayed on the chalk board for interpretation.

The next day the group was given an opportunity to discuss their findings. We were extremely gratified to find that each group had identified the key issues with each stove. Often their final conclusions differed from the initial observations. This exercise was successful in giving students the tools for distinguishing between good and bad stoves and liners.

The subject of followup was put into perspective by having both the CEB and Sarvodaya describe their field programmes, with focus on the role of District Extension Coordinators in dissemination. In both approaches, followup was a key responsibility for the extension coordinator. After a brief lecture further explaining the role of followup, each student was given 2 followup forms (see appendicies 6 and 7). The form was discussed line by line, and general questioning courtesy and methods were discussed. Each student went to two houses which had improved stoves to make observations. To summarise the study of followup, each student acted through a brief report of observations both to his "supervisor" and the installer (which for these stoves was Mr. Bandara). Students were directed to discriminate between the general experience of the field visit and the particular information which would be valuable to the other parties.

In the later class sessions stove installation was practiced and other issues were discussed. The course was concluded with a comprehensive test and course evaluation (see appendicies 8 and 9).

EVALUATION

Overall, the training was quite successful. It went more smoothly than expected and the students expressed appreciation for what they learned. The content was dense, and every effort was made to distribute translated lecture notes and handouts to assist the comprehension and memory of the trainees. The training received excellent support from all concerned parties: Sarvodaya, CEB, and ITDG. Mr. Lamasena's preparatory work was of great help throughout the course.

As always, there were faults with the training that are worth considering with regard to future trainings of this sort.

1. The training programme was over-ambitious. Too many subjects were to be covered in a short time. As a result, there was far too little time for classroom discussion which is essential for clarifying ideas and reading the actual level of comprehension of the students. This problem was recognised in the days prior to the training, but those in charge of the training (Lamasena, Selker, Childers) chose not to substantially alter the course content due to their limited planning inputs. In future trainings, priorities should be limited to those

subjects which can be treated thoroughly - this one had three priority subjects, and that was two too many. Within each subject, we included too much information for students to absorb. Short topics such as chimneys and in-depth technical ceramic detail seemed worthwhile for setting the context of the main points. However, the sense of what was essential got lost, partly in the translation and partly due to the sheer volume of information. We underestimated the mental strain involved in absorbing so many ideas. The diverse levels of experience amongst the trainees complicated this matter. We chose to direct the level of information toward those most likely to use it, i. e. the more knowledgeable.

2. Inadequate translation severely hampered the communication of ideas in lectures. The training planners anticipated that translation would not be necessary. Once the training was underway it was seen that a full- time translator was necessary, and one was hired. However, the technical vocabulary and esoteric concepts caused problems, particularly with the over-enthusiastic translator who sometimes jumped ahead of the lecturer he was translating for and gave exactly the opposite meaning. Although most of these mistakes were caught, this caused much confusion for the class. Also, many of the technical ceramic words have no direct parallel in Sinhalese, and succeeding lecturers used different words for given definitions. Although both of the main Sinhalese-English speakers were specially briefed on the difficult vocabulary, ideas were made substantially more confusing because of the partial knowledge of the translator. More time allocated to the selection and preparation of the translator could have helped to mitigate this problem.

3. While Sarvodaya District Center was on the whole an excellent site for such a training, there were several drawbacks to our exact location. The room is nearby the metal and wood shops, and their machinery was quite noisy most of the day. Also, the room itself was too small for so many people. Additionally, there were some complaints of a different nature from the students about being required to attend Sarvodaya's Family Gatherings every evening, as these occupied most of the time students had for relaxation and study.

Feedback from the students at the close of the training was overall positive. Primarily, they felt that the training was well organised, the amount of time and amount of work were fine, but that there was too much theory in relation to practical work, and too little time for classroom discussion. They would have liked more time for practical work with producing the stove liner and installation. A synopsis of (translated) evaluation responses is given in Appendix 10.

FOLLOWUP REPORT

Visit to Hambantota and Ratnapura Districts

CEB/Energy Unit - Trained Pottery Liner Producers

Sept. 1985

By Laurie Childers, ITDG Stoves Project

Hambantota District

Mr. Ranasinghe, Coordinating Officer
Mr. K. K. Ariyasena, trainee extensionist

Ratnapura District

Mr. K. D. Wijeratna, Coordinating Officer
Mr. H. Dayananda, trainee extensionist
Mr. Bandara, Trainer for CEB/Energy Unit Stove Programme

SUMMARY

The training of potters in Hambantota and Ratnapura Districts is proceeding remarkably well. This is due mostly to the competence of Mr. Bandara, the trainer, and to the support system of the CEB and District Government of Sri Lanka infrastructure. It is recommended that the present training and followup system continue, maintaining careful quality control. Financial arrangements must be clarified so that potters get paid promptly.

ACTIVITIES

One week was spent in Hambantota District with Mr. Ranasinghe. Initially a discussion was held with the Assistant Director of NORAD's IRDP, which funds the project. We visited approximately 34 pottery households is 6 divisions, and talked with 5 Assistant Government Agents (responsible for collecting and distributing stoves) and one Special Service Officer (responsible for coordinating installers and householders). Unfortunately we spent only 2 hours with Mr. Ariyasena, the trainee.

In Ratnapura District, the two pottery villages which are producing stoves were visited: Kallekolonne (18 families) and Damana (5 families) and their headmen. One day was spent in each village. Mr. Bandara did some training of one of the Damana potters, and the author conducted a demonstration of the the score and slip method of making strong joints. Mr. Dayananda was present for both days, and Mr. Wijeratne for one day.

At each pottery site, we evaluated the quality of stoves produced and discussed the dimensions with the potters. We asked the potters if they had any problems with cracking and discussed possible solutions to those problems with them.

OBSERVATIONS

1. The quantity and quality of training done by Mr. Bandara far exceeded the author's expectations. Of the nearly 60 potters visited, only a handful were producing imperfect stoves, and those had only marginally incorrect dimensions. Mr. Bandara's manner is that of precision, patience, and persistence. Around most potter's houses is a line of pottery fireboxes being used as flowerpots. The potters would laugh and say, "These were from my training period." The demands for precision necessary in the early stages have more than paid off in the obvious quality of liners produced.

2. Overall the level of pottery skills is quite high, particularly in Ratnapura, with several outstanding pottery households in both districts. Some potters had trained themselves to build the liners. In Hambantota, the clay mixtures and construction techniques varied even amongst potters living right next door to each other. Use of any particular technique (coil or wheel methods) did not seem to affect the final quality.

3. Most potters seemed to have one or two very minor problems. These include:
   a) cracking of liners during the firing, especially those loaded on the bottom of the kiln;
   b) cracking of joints due to faulty construction;
   c) potholes too large or small (templates not always used);
   d) potrests too thick, and/or not strongly attached;
   e) airholes too large and/or too high;
   f) off-round firebox potholes.

Potters in Ranna, Hambantota District, were the only ones who complained about the loss of liners due to cracking during firing. Other potters said that they actually had less loss of liners than of traditional pots, which are much thinner and break more easily. Potters were happy to make the stoves for Rs. 15 each, taking the average 10% breakage at a loss.

4. The worst problem encountered regards the organisation of finances. In Hambantota District, there is often a 3 week delay in paying potters. Most potters are quite poor and live hand-to-mouth. Aside from being unfair to the potters, it will soon discourage them from producing stoves.

5. There is an enormous amount of transport for the liners required using the present dissemination method.

RECOMMENDATIONS

1. Continue close contact with potters, giving attention to quality control and problem solving. It seems to be fairly easy for potters to make minor mistakes that they haven't been making previously, such as raising the airhole too high, altering the door shape or size, etc. Templates may need to be refined and redistributed. Also, the potrests on the second potholes should be about 1 cm thick only. This small detail greatly affects the fuel consumption of the stove.

2. When liners are being purchased, they should be carefully screened for cracks that have been "repaired." Many potters tend to smear clay into cracks just prior to firing, but this is a disguise and <u>not</u> a repair. These cracks are often in the joints.

3. By the middle of the third year of the project (1987), attention should be given to switching over to a sustainable marketing system. Methods of transport and quality control will have to be devised. It will be necessary for the public to have a sense of what is a high-quality stove. The Energy Unit should award a "seal of approval" to those potters who are making particularly precise, high-quality stove liners. This could be in the form of a stamp that they use to mark their ceramics, and/or a certificate that can be displayed at their workshop or in retail markets.

FOLLOWUP REPORT

Kurunagala and Kandy Districts

Sarvodaya Extension Workers

Sept. 1985

By John Selker, ITDG Stoves Project

1. Mr. Lamasena of Sarvodaya and myself visited Mr. Dammith, trainee, for 3 days at his site in the Kurunagala District of Sri Lanka. We assisted him in his first 3 working trips to potters in his area. He seems confident and well-prepared. Since a stove installer's training was carried out in the area 1 year ago, the demand for improved stoves is already established.

In our discussions, we focused on how Mr. Dammith could make his stove work as self-supporting as possible. The Kandy District Center had already supplied 30 stove liners, and an account of almost Rs. 700 has been established through the installation of these stoves. This site was seen to be an ideal place to investigate ways to smoothly transfer the improved stove technology within the Sarvodaya system.

From this perspective we left Mr. Dammith with a strategy for starting his stove project. We encouraged him to write a proposal for covering his Rs. 300 per month tramsportation expenses to the District Center. From later conversations with Mr. Amerasekera of the C. E. B., we believe additional support will be forthcoming from the C. E. B. for Mr. Dammith's work.

2. Mr. Lamasena, Steve Raggett, Laurie Childers, and myself visited trainee Mr. Somaratna for 1 day at his site in Kandy District. His work with stoves predates the training by two years. He was working with a potter who was making high quality stoves, and Mr. Somaratna had a team of installers actively working. By and large we were quite impressed by Mr. Somaratna's ingenuity and perserverence.

The economic side of his efforts were particularly interesting. He purchased liners from the potter for Rs. 15 each, including delivery. He then sold the liners to the installers for Rs. 30 each. The installers in turn sold the completed stove to the households for Rs. 45.

Only one serious problem was observed. Mr. Somaratna had decided that two sizes of stoves were required in his area, and instructed the potter to make a 2/3 size version. This smaller stove was observed in operation in homes and was seen to be unacceptable. The shorter firebox quenches combustion, cooling

the flame, making smoke, and leading to thick buildups of creosote in the second pothole. Mr. Somaratna was shown these problems, and understood he needed to rebuild the smaller stoves and discontinue their production. He can order stove liners with potholes of a smaller diameter, but the fireboxes must be of the same height as the regular firebox.

APPENDIX 1

TIMETABLE

WEEK 1		LECTURERS
Day 1 - Monday		
a.m.	Introduction - people - description of SSM & CEB programs	Secretary, Min. of Power & Energy Prof. K. Perera
	Why the stove is designed like it is	
	- technical aspects - Socio economic aspects	Lamasena Bandara
p.m.	How the stove works (demonstration - cooking lunch)	Lamasena
	Design and effect of changes on stove performance	J. Loose
Day 2 - Tuesday		
	Pottery materials: clay, clay preparation	L. Childers
	Introduction to making stoves	
	forming and joining drying and shrinkage firing theory (demonstrations and theory)	
Day 3 - Wednesday		
a.m.	Visit to pottery at Wallalla	Lamasena
	Demonstrations: making coils coiling firebox coiling tunnel throwing second pot, adding knobs use of templates assembly of tunnel and door	
p.m.	Making stove parts (training by potters in the group)	Supervised by Lamasena or Bandara
Day 4 - Thursday		
a.m.	Assembly of stove parts	L. Childers
p.m.	Reviewing construction	L. Childers
Day 5 - Friday		
a.m.	Training potters and firing - quality control - problem solving - clay modification and improvements - economics and breakage - tradition and science	J. Selker L. Childers

cont'd .....

WEEK 2		LECTURERS
Day 6 - Monday		
a.m.	Evaluation of stoves/testing	John Selker
	Qualitive observation Measurement of ciritcal dimensions	
p.m.	Comparative cooking tests	
Day 7 - Tuesday		
a.m.	Summary of stove evaluation	John Selker
	Intro to follow up	Ms. Harshini Navaratne Sarvodaya Dist. Coordinator
		Mr. Lamasena, Overall Coordinator, CEB Energy Unit, Stoves
p.m.	Follow up at local homes	Selker/Lamasena/Bandara
Day 8 - Wednesday		
a.m.	Follow up summary	John Selker
	Chimneys/introduction to installation	John Loose/Lamasena
p.m.	Practice Installation at Training Site	Lamasena/Bandara
Day 9 - Thursday		
	Practical installation at local homes	Lamasena/Bandara
Evening - slide show		Selker/Childers
Day 10 - Friday		
a.m.	Review	Lamasena
	Test	Bandara
p.m.	Evaluation	Childers
	Closing	J. Loose Sisira Navaratne

Appendix 2

CLAY AND CERAMIC LECTURE NOTES Sri Lanka CEB/Sarvodaya Training Day 2
Laurie Childers ITDG 15 August 1985

Today we want to increase your understa nding of clay, what it is and what happens to it between taking it out of the ground and becoming a finished stove liner.

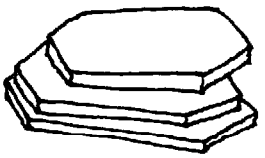
What is clay?

The term clay refers to a certain particle size of a soil mineral.

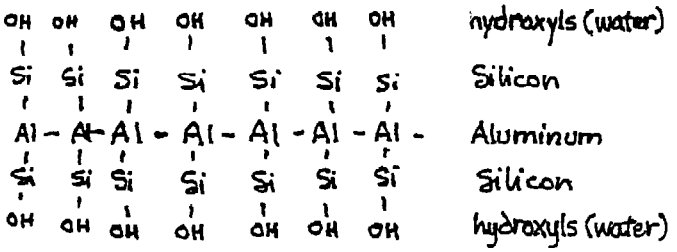
Clay comes from weathered rocks. When rocks are exposed to sunshine, to heat and cold, to rain and ice, they decompose, or break down into small particles. This is usually a very slow process, and some rocks take much longer to decompose than others. Some rocks break up rather easily, and get carried downhill by glaciers or streams. The finest particles get carried the farthest. they are often dropped only when the river spreads out over a flood plain and slows down. Many layers of these tiny particles become clay deposits. (Some clays are formed differently: the rock decomposes inplace. These clays are usually very white.)

Clay is defined as a particle size which measures 10 microns or less in size. That means that 100 of the largest clay particles, side by side, would measure only one millimeter across. Silt is the next largest particle size: 40 of the largest silt pa rticles measure one millimeter across. Sand is the next largest particle size: fine sand measures up to one third of a millimeter across.

Why does clay stick together?



shape of
clay particles



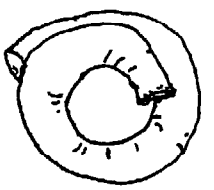
chemical structure of clay (simplified)

Clay particles are hydrated, that is, they are chemically bound to water. Even after clay has dried in the sun, there is still water between the the clay particles. This bonded water sticks to other water, and so the particles of wet clay are both attached and lubricated by the water between them. The clay particles slide apart or closer together as the clay is pressed and formed.

Smaller particles of clay have more surface area, and can hold more water in between them relative to larger clay particles. Clay that is very sticky has small particles of clay.

The ability to stick together, and to be formed without cracking, is called PLASTICITY. If clay can be easily shaped, we say it is highly plastic. If it breaks when coiling around your finger, it is not very plastic. Plastic clay is flexible due to having a good mix of particle sizes. Plastic clay has some very fine (small) clay particles. But very fine clay, all by itself, is too sticky to work with.

non-plastic
clay



plastic
clay

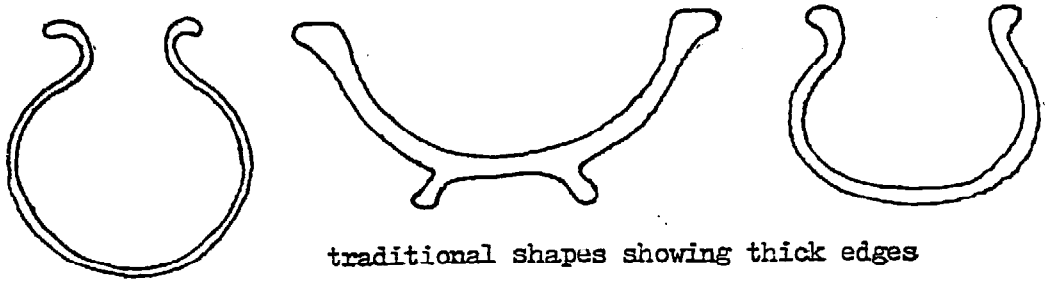
One of the reasons we blend different clays together to make pots and stove liners is to get good plasticity. This enables the clay to be formed without cracking, and also dry without cracking.(The clay grips and holds onto itself.)

Plasticity also increases with ageing the clay. In many parts of the world, potters mix clay weeks or months before they use it. In China, potters work with porcelain, a non-plastic clay. They mix clay for their grandchildren and use clay made by their grandparents.

What happens during drying?

After a clay piece has been formed, it is left to dry. While drying, most of the water between the particles of clay evaporates into the air. Just like drying clothes, this happens faster when the air is warm and dry and the piece is in the sun. However, with clay pieces, it is very important that they dry evenly - from side to side, top to bottom, and inside and out. Careful drying is important because as the water between the clay particles evaporates, the clay particles more closer together. This results in the piece shrinking in size. If one part of the pot or stove liner dries faster than another part, then it shrinks more and cracks away from the rest.

Thinner parts dry faster than thicker parts, so it is important that the clay walls be of all the same thickness. The edges of any pieces should be slightly thicker because they dry faster.

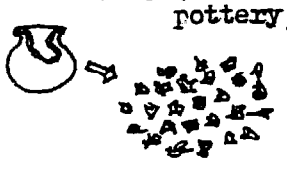


traditional shapes showing thick edges

Traditional folk potters usually add materials with large particle sizes to the clay mix to help the pieces dry evenly. The relatively large grains of sand, mica, or "grog" (crushed fired clay) do not shrink. They also allow a path for water between particle inside the clay wall to pass toward the ouside of the clay wall and evaporate. The tiny holes in such clays make them porous, we say they have high porosity. (A sponge is another example of porosity.) Very plastic clays, all by themselves, tend to warp and crack (unless they are very slowly and very carefully dried).

sand

grog (crushed pottery)



mica (a soft rock that has thin layered crystals)

The clay is actually strongest during the leatherhard drying stage. This is when the clay is stiff and feels like leather - not quite wet and not quite dry. It is difficult to deform or pull apart. When clay is very dry (much lighter in color), it easily chips when bumped because there is not enough water to hold the particles together.

What happens when the clay is fired?

During the firing process, the clay changes to ceramic. After proper firing, the piece cannot be dissolved into clay again. There are several stages of firing which are important to to look at in respect to firing pottery stove liners.

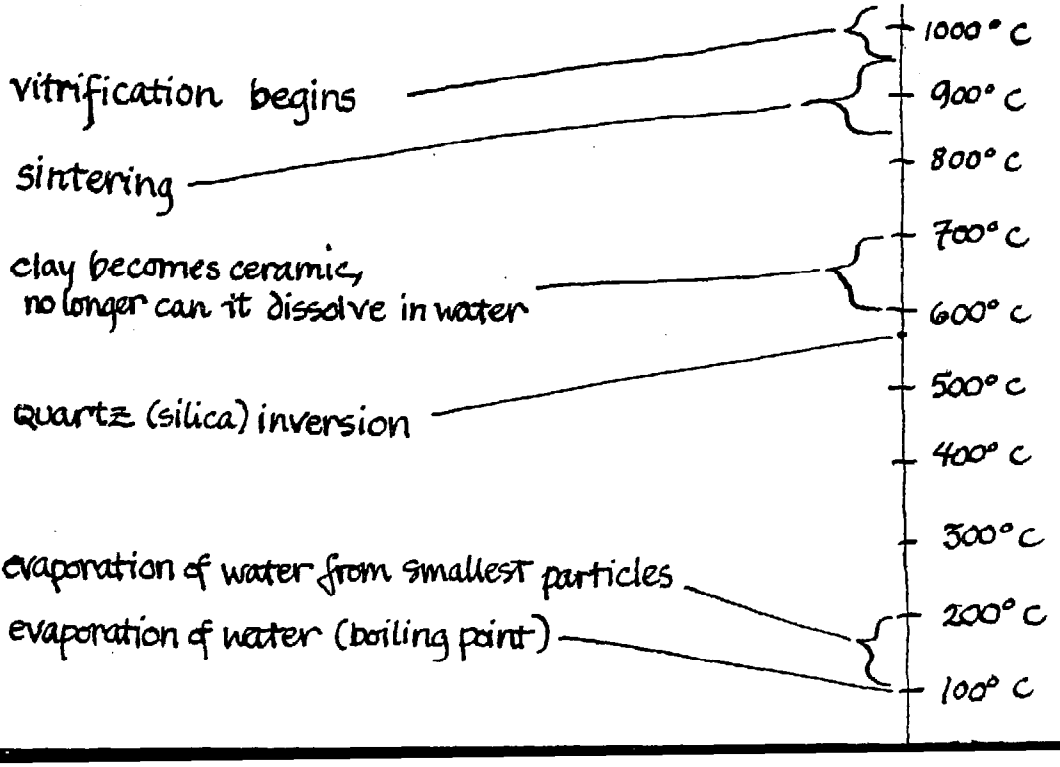
At 100° C, water is boiled out of the clay. Between 100° and 200° C, water finally escapes from between the tiniest clay particles. When water turns to steam, it expands greatly. Therefore the early stages of firing must be very slow so that the steam does not form inside the clay walls. Steam can cause little explosions or cracks in the clay pieces.

At 573° C quartz inversion occurs. This is marked by a structural expansion of the free silica in the clay body. At temperatures below 573° C, the silica crystals are in a cramped state. At 573° C, it suddenly stretches out into a symmetrical shape that is 1% larger in size. It stays in this state until it cools below 573° C, when it suddenly inverts back to the cramped state and shrinks 1% in size. In the same way that thin parts of a piece might dry too fast, there can be problems with thin parts during this stage of the firing. The kiln should heat slowly during quartz inversion so that all parts of the ceramic pieces reach 573° C at the same time. Otherwise the thinner parts may crack off.

Upon reachin the temperature range between 600°and 700° C, the clay will no longer dissolve in water. In fact, it is no longer clay. It is now ceramic, but has yet to develop a good ceramic bond. It is weaker now than when it was dry clay.

Between 850°and 950° C, the solid particles begin to sinter. Sintering is what gives ceramic pieces fired strength. The particles stay solid but the surfaces begin to "weld" together, much like iron pieces weld together without melting. Other minerals in the clay, such as potassium or iron, will help encourage sintering. After sintering, the particles are no longer separate, but have joined into one very porous piece.

At temperatures above 950° C, the ceramic begins to vitrify. It becomes more and more like glass. And, like glass it is unsuitable for stoves. The particles melt together and fill the pores between them. (The ceramic shrinks significantly as it vitrifies.) While stoves are used for cooking, parts of it receive enough heat to expand significantly. Low-fired (900° C) porous stoves can absorb the shock of thermal expansion because of the spaces between the "particles." High-fired ceramic has no room for uneven thermal expansion, and the firebox is likely to crack.



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ශ්‍රී.ල.වි.ම. හා සර්වෝදය ඒකාබද්ධ දර උදුන් පිලිබඳ පුහුණුව සර්වෝදය දිස්ත්‍රික් මධ්‍යස්ථානය 1985.06.13 වෙනි දින ලූරි විල්ඩර්ස් මහත්මිය අප්.ට්.ඩ්.පී.

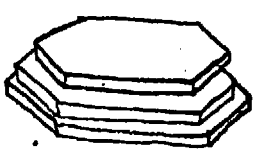
අද අපිට මැටි පිලිබඳ ඔබගේ දැනුම වර්ධනය කිරීමට අවශ්‍ය වේ. මැටි යනු කුමක්ද? එසේම එය පොලවෙන් ගැනීමටත් ලිපක් සෑදා අවසන් කිරීමත් අතර, වෙනස කුමක්ද දැනගත යුතුය.

<u>මැටි යනු කුමක්ද?</u>

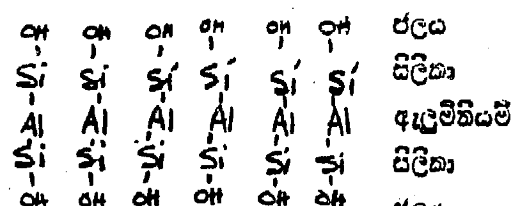
මැටි ඛනිජ ද්‍රව්‍යවල තිබෙන එක්තරා වර්ගයක කුඩා අංශු වශයෙන් සඳහන්කල හැක. මැටි ලැබෙන්නේ පර්වත වලට කාලගුණය බලපෑමෙනි. පර්වත හිරු එලියට, උෂ්ණත්වයට, සීතලට, වැස්සට අප්ස්වල බලපෑම නිසා එහි ක්‍රියාකාරිත්වය කරනකොටගෙන ඉතා කුඩා කැලි වලට කැඩී යයි. මෙය ඉතා හෙමිහිට සිදුවන්නකි. එසේම සමහර පර්වත වෙනත් පර්වත වලට වඩා මෙසේ කුඩු සිදුවීමට කාලයක් ගනවේ. සමහර පර්වත ඉතා පහසුවෙන් මෙසේ කැඩේ. ඉන් පසුව ඒවා වර්ෂාව නිසා නිම්න වලට ගලායයි. ඒවායේ හොඳ කොටස් ඈතට ගලායයි. ඒවා ගංවතුර ගලන කාලයට ගඟෙහි දෙපස මිංදන්නට පටන් ගනී. මෙසේ ක්‍රියාවලියක් සිදෙන විට එම තට්ටු මැටි බවට පත්වේ. සමහර මැටි වර්ග වෙනත් වෙනත් ක්‍රම වලට හැඩගැසේ. පර්වත වෙනත් ක්‍රම වලට දියායයි. ඒවා සාමාන්‍යයෙන් සුදුපාටය.

මැටි සාමාන්‍යයෙන් මයික්‍රෝ 10 ට හෝ රටත් වඩා කුඩා ප්‍රමාණයේ අංශු වලට ගතහැකිය. මෙහි අදහස වනුයේවය පැත්තෙන් පැත්තට සියවාරයක් විශාල මැටි අංශු මිලි මීටර් 1 ක් පමණ මැතිය හැකිය. ඊලඟට විශාල අංශුව නම් මිදෙන මැටිය. 40 වාරයක් විශාල මෙම අංශුවක් හරහට මිලි මීටරයක්වේ. ඊලඟ එගීය නම් වැලිය. ඉතා හොඳ වැලිකැටයක් මිලි මීටරයකින් 1/3 කි.

<u>ඇයි මැටි එකට ඇලෙන ගතියකින් යුක්ත වන්නේ?:-</u>



මැටි අංශුවල හැඩය

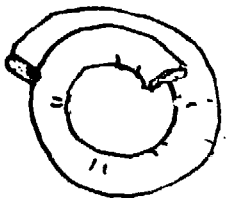


මැටිවල රසායනික සංයුතිය

මැටිවල රසායනික ව්‍යුහය සාමාන්‍යයෙන් මැටි අංශුවක ජලය ඇත. එහි අදහස ඒවා රසායනික වශයෙන් ජලයෙන් බැඳී ඇත. මැටි අව්වෙන් වැස් ඇතත් ඒවාතුල ජලය ඇත. ඒ නිසා ජලය අතික් කොටස් වලට එකතු වේ. එනිසා මෙම අංශු මෙත මැටි එකට ඇලෙන ගතියෙන් හා ලිස්සන ගතියකින් යුක්ත වේ. මිනිසා මැටි එකට හැඩගන්වන විට හෝ තනු කරන විට ඇලේ.

ඉතා කුඩා මැටි අංශුවල මුදුනත බොහෝ ඇත. ඒවායේ විශාල කැලි වලට වඩා ජලය උරාගන්නා සිදුරු ඇත. ඉතා හොඳට ඇලෙන මැටිවල ඉතා කුඩා මැටි අංශු ඇත.

ඇදෙන සුළු ගතිය යනු මැටිවල ඇලෙන ගතිය හා එය නොකැඩී තබාගැනීම - ට හැකිවීම. මැටි පහසුවෙන් හැඩ ගන්වා ගැනීමට නම් අපි එය හොඳට ඇදෙන ගතියකින් යුතු මැටි බව තීරණය කරනු ලැබේ. එය ඔබගේ ඇඟිලි වටා ඔතන විට කැඩේනම් එය හොඳට ඇලෙන ගතියක් නැත. ඇලෙන සුළු මැටිවල ඇදෙන ගතියක් ඇත්තේ එය හොඳ මිශ්‍රණයක් හා ඉතා කුඩා අංශු තිබෙන නිසාය. ඇදෙන සුළු මැටිවල ඉතා කුඩා මැටි අංශු ඇත. නමුත් ඉතා හොඳ මැටිවල බොහෝ දුරට ඇලෙන ගතියකින් යුතු වැඩට පහසුය.



අපි වෙනස් වෙනස් මැටිගෙන වැඩ කරන වලං සාදන ලිප් සඳහා එක හේතුවක් තමි මැටිවල ඇදෙන සුළු ගතියයි. එය පිපිරීමක් නැතිව හැඩගන්නා ගැන්මට පහසුය. ඒවා වේලෙන විටද නොපිපිරේ. මැටි එකට ඔෝදාට තද වේ.

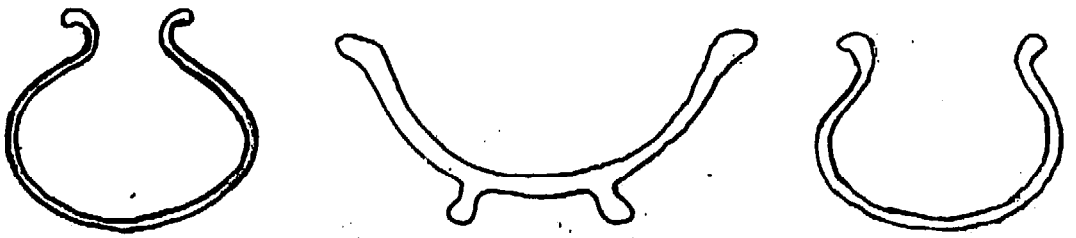
ඇදෙ සුළු ගතිය මැටිවල කල්පැවැත්මවද බලපායි. ලෝකයේ බොහෝ රටවල වලං සාදන්නන් මැටි වැඩ කිරීමට ප්‍රථමයෙන් කිපයකට හෝ මාස කිපයකට පෙර මැටි අනාවරණයි. ඊතයේ වලං කාර්මිකයින් පෝසිලේන් නම්වැනි මැටි වලින් වැඩ කරයි. ඒවා ඇලෙන සුළු ගතියක් නැත. එම නිසා යටුන් යටුන්ගේ දරු මුණුපුරන් විසින් පාගා මැටි සූදානම්කර තබයි.

<u>වියලෙන විට මැටි වලට සිදුවන්නේ කුමක්ද?</u>

මැටි කැබලි හැඩගැන්වීමෙන් පසුව එය වේලීමට ශුද්ධ හරිනු ලැබේ. ඒවා වේලෙන විට අණුවල තිබෙන බොහෝ පලය වාතයට ගුමාල වේ. මෙය සිදුවන්නේ ටෙදි වේලෙන ආකාරයටය. මෙය වාතය තනුසුම් අවස්ථාවල හා ඒවිච සැර අවස්ථාවල ශුන්මයින් සිදුවේ. කෙසේ හෝ මැටි කැබලි ඒවායේ පැත්තෙන් පැත්තට වියලීමට අවශ්‍ය ශුභල සිට පහළටක් පිටත සහ ඇතුලත පලය ගුමාලය වන නිසා වියලෙන විට ඔසිලීමක් විය යුතුයි. මැටි අණු ශුන්‍ය ක්‍රිවිටුව තිබෙන නිසා මෙය සිදුවේ.

වලඳේ හෝ ලියම්

එක කොටසක් අනෙක් කොටසට වඩා ශුන්මතට වියලෙන විට එයි අත් කොටස් පිපිරීමට පටන් ගනී. ගතකම නැති කොටස් හා ගත කොටස් වලට වඩා ශුන්මයින් වියලේ. එම නිසා සෑම කොටසන්ම එතර ගතකමකින් තිබීම වැදගත්ය. ඒවායේ අයින තරමක් ගතකමට තිබිය යුත්තේ එය ශුන්මයින් වියෙලෙන නිසාය.

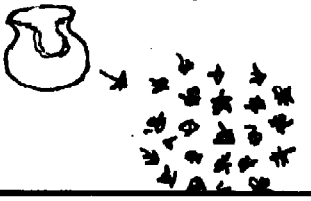


පාරම්පරික භාණ්ඩවල ගණකම අයිකයින් පෙන්නුම් කරයි.

පාරම්පරික වලත් සාදන්නන් ඒවා වියලීමට පහසු වීමට සාමාන්‍යයෙන් වෙනත් දුව්‍යයන් එම මැටි වලට එක් කරයි. සාමාන්‍යයෙන් වීහාල වැලි කැට මසිකා හෝ වියළුනු මැටි (පිලිස්සුනු කැබලි අඹරා) මිශ්‍ර කල විට ඒවා හැකිලෙන්නේ නැත. ඒවා අණු අතර ජලය රදා පවතින ජලය පිට වීමට උදව් වේ. එසේම ගුමාලය වී ඉවත් වීමටද උපකාරී වේ. මෙම ශුභ කුඩා සිදුරු පොරෝසිටි යනුවෙන් හැදින්වේ. ස්පන්ජි එකක් මෙයට හොඳ නිදසුනකි. ශුභ හොඳ ඇලෙන සුළු මැටි වුවද ඒවා හොඳට ප්‍රවේසම් සහිතව වේලුවේ නැත්නම් පිපිරීමට ශුද්ධ ඇත.

වැලි.

පිලිස්සු මැටි කුඩු කර සාදා ගත් මැටි.



මසිකා. මෘදුකැට තුනී පතුරු, තුනී කැබලි.

3.

ඇත්ත වශයෙන්ම මැටි වියලෙන අවස්ථාවේදී එය ඉතා හොදට ශක්තිමත් වේ. හොදට වියලීමෙන් හෝ ඉතාමත් තෙතට තිබීමෙන් ඒවා නැවත හැඩ ගැන්වීමට අමාරුය. මැටි හොදට වේලුනාට පසුව ඒවා පහසුවෙන් කැබලි වලට කැඩෙන්නේ ඒවායේ ඇති තරම් වතුර ඒවා සවි වීමට නැති නිසාය.

<u>මැටි පිලිස්සුවාට පසුව සිදු වන්නේ කුමක්ද?.</u>

මැටි පිලිස්සීම අරඹන විට එය පිලිස්සුනු මැටි බවට පත් වේ. හරියාකාර පිලිස්සීමෙන් පසුව ඒවා නැවත මැටි බවට පත් කිරීමට බැරිය. මෙම මැටි පිලිස්සීමේදී ඉතාමත් අවධානය යොමු කල යුතු පියවරවල් කීපයක් ඇත.

සෙ. ශ්‍රේ 100' මැටි වල ජලය උතුරයි. සෙ. ශ්‍රෙ. 100'–200' ජලය ඉතා කුඩා අංශු වලින් ඉවත් වේ. ජලය හුමාලය බවට පත් වන විට එය විශාල වේ. එම නිසා පුලුස්සන පලමු පියවර වලදී ඉතා සියුම්ව කල යුතු වන්නේ එහි ඇතුලට නැවත ජලය නොයන පරිදි පිලිස්සීමය. මෙම හුමාලය කුඩා පිපිරීම් වලට හේතු වීමට ඉඩ ඇත.

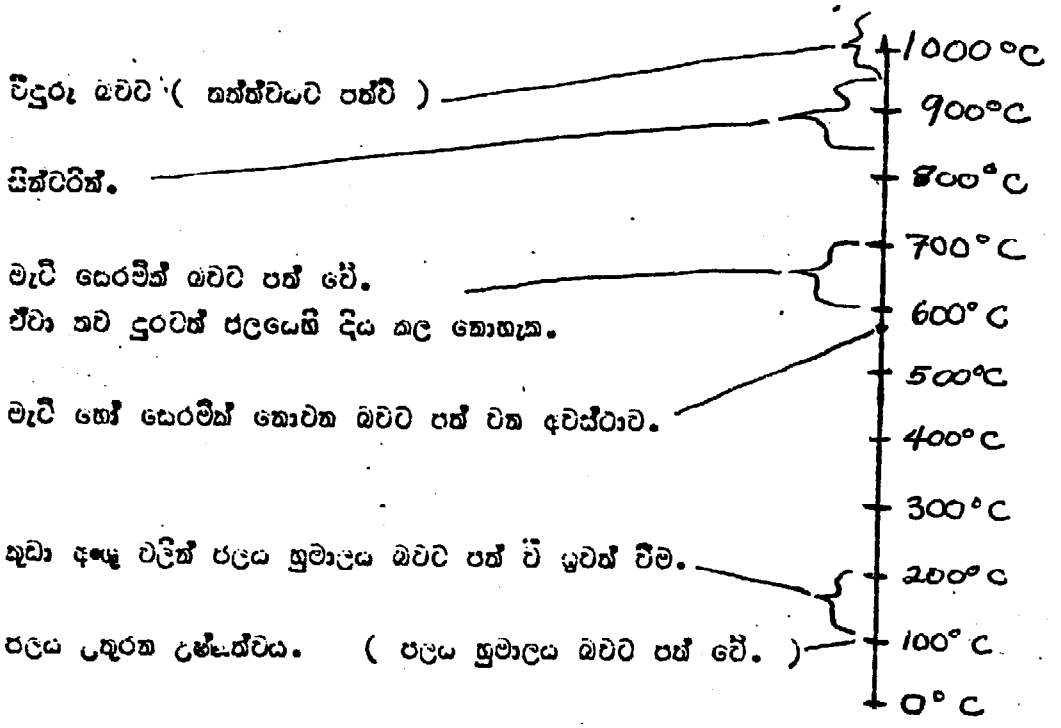
සෙ. ශ්‍රෙ.573' ද එය මැටි හෝ සෙරමික් නොවන තත්වයට පත් වේ. සිලිකාවල ඇති නිදහස් ක්‍රියාව නිසා මෙය පලල් වීමට ඉඩ තිබේ. සෙ. ශ්‍රෙ. 573' පහල මෙම සිලිකා බිරිවැටෙන තත්වයට පත් වේ. සෙ. ශ්‍රෙ. 573' දී ඒවා හදිසියේම 1% කින් විශාල වේ. එය සෙ. ශ්‍රෙ. 573' පහලට සීතල වනතෙක් පවතී. මෙම හදිසියෙන් හිරි වැටුනු තත්වයට පත් වුනු විට 1% කින් හැකිලේ. එම ආකාරයෙන්ම තුනී කොටස් ඉක්මනට වේලේ. එම නිසා පිලිස්සීමේදී මෙහිදී ගැටළු ඇති වීමට පිලිවන. මෙම මැටි පිලිස්සුනු තත්වයට පත් වන විට පෝරනුවේ තත්වය ක්‍රමානුකූල විය යුතුය. එනිසා කිල් භාණ්ඩයේ සෑම කොටසක්ම එකම වේලාවේදී සෙ. ශ්‍රෙ. 573' ද උෂ්ණත්වයට පත් විය යුතුය. එසේ නොමැති නම් එහි තුනී කොටස් ඉක්මනට පිපිරේ.

උෂ්ණත්වය සෙ. ශ්‍රෙ. 600 – 700 ත් අතර වන විට මැටි තව දුරටත් ජලයෙහි දිය කල නොහැක. ඇත්තවශයෙන්ම ඒවා තව දුරටත් මැටි නොවේ. ඒවා දැන් පිලිස්සී ඇත. එහෙත් හොද තත්වයට පත්වීමට තව පියවරවල් කීපයක් ඇත. එය දැන් වියළුනු ඒවාට වඩා ශක්තියෙන් අඩුය.

සෙ. ශ්‍රෙ. 850' – 950' අතර සිට අංශු සින්ටර් බවට පත් වේ. මෙම කොටස් සෙරමික් ශක්තිමත් වීමට උපකාරී වේ. මෙම අංශු සිටිරව තිබෙන අතර එහි මතුපිට උනුවීම සිදු වේ. යකඩ කැබලි උනු නොකොට එකට සවි කරන්නාක් මෙන් මැටි වල වෙනත් ඛනිජ පොටෑසියම් හෝ යකඩද ඒවා සින්ටර් වීමට උපකාරී වේ. මෙයට පසුව මෙම කොටස් වෙන් කල නොහැක. නමුත් එකක් බවට පත් වී ඇත.

සෙ. ශ්‍රෙ. 950' දී එම සෙරමික් උනු වීමට පටන් ගනී. ඒවා වීදුරු තත්වයට පත් වේ. වීදුරු මෙන් ඒවා ලිප් වලට ගුසුදුසුය. අංශු උනු වී සිදුරු සියල්ලම වැසේ. (ඉතා හොදට සෙරමික් හැකි ලි ඒවා උනුවේ.) ලිප කෑම පිසීමට ප්‍රයෝජනයට ගන්නා විට උනුසුම රදා පවතින කොටස් ඉක්මනට පලල් වේ. සෙ. ශ්‍රෙ. 900' පහල තත්වයට පිලිස්සූ ලිප් වල සිදුරු ජලය උරා ගැනීමට හැකි තත්වයට පත් වන්නේ ඒවා අතර තිබෙන්නා වූ ඉතා කුඩා අංශු අතර ඉඩ නිසයි. ඉතාමත් හොදට පිලිස්සුනු සෙරමික් වල පලල් වීමක් ඇති නොවෙන නිසා එහි පිපිරීම් ඇති වීමට ඉඩ තිබේ.

4.


1000 °C
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විදුරු බවට (තත්ත්වයට පත්වී)
සිමෙන්ටිත්.
මැටි සෙරමික් බවට පත් වේ.
ඒවා තව දුරටත් ජලයෙහි දිය කළ නොහැක.
මැටි හෝ සෙරමික් නොවන බවට පත් වන අවස්ථාව.
කුඩා අඟෝ වලින් ජලය ඝනාලය බවට පත් වී ශුවත් වීම.
ජලය උතුරන උෂ්ණත්වය. (ජලය ඝනාලය බවට පත් වේ.)

WORKING WITH POTTERS ON STOVES

Selecting Your Potter

Selecting potters is a very important step - maybe the most important. Look for these qualifications:

1. High quality work. Pots that are
   a) symmetrical;
   b) having even thickness;
   c) without cracks;
   d) well fired, with even color and a good ringing sound.
2. Good location for clay and distribution. This is essential for avoiding delays and having access to markets.
3. Efficient production. You want a potter who
   a) works hard;
   b) works full time;
   c) has enough work and storage space for drying large numbers of stoves;
   d) uses a pottery wheel.
4. Willingness to learn and try new things.
5. If a potter is also willing to teach, s/he will be of great value in training other potters.

Training

In training a potter, you must be respectful, patient, and persistent. To achieve good quality pottery stove liners, the potter must be careful in clay preparation, forming, and handling the liners while they are moist - much more careful than in making traditional pots.

Each potter has his/her own way of working. There are usually good reasons for the habits they have. Thus you should only try to change their habits when there is a particular problem caused by the habit.

Method:

In the beginning, bring a top quality liner with you. The potter will learn most of his/her lessons from this example. Leave the liner with the potter, and order one (1) liner exactly like it. Let the potter make the stove without any instructions or templates.

When it has been fired, measure the dimensions and assess the quality. Discuss with the potter the differences between his or her stove and the sample you brought.

Then order five (5) more stoves. This time, work closely with the potter, giving instructions in the use of templates and careful handling. (Give the potter a set of templates.) Come back in two days and give instructions in assembling the pieces. Follow closely and avoid letting the potter make any mistakes - these soon become bad habits, difficult to change. Let the stoves be fired. Discuss their quality with the potter.

Then order ten (10) stoves. Work with the potter and encourage use of the templates and proper handling. Discuss any flaws with the potter before and after firing. If these stoves are

of good quality, order twenty (20) more. (If they are not all of acceptable quality, order only ten (10) more stove liners.) Let the potter make these without your assistance. But always select out unacceptable stoves before firing.

Increase the number of stoves you order from the potter according to the quality he is producing. For at least six (6) months, check the stoves before they are fired. Do not let the potter fire stoves that are distorted or have incorrect dimensions. This is crucial to developing the potter's discipline, and avoiding misunderstandings with him/her.

Emphasize these points while training:

Pottery liners must be made to the proper dimensions. Most potters will resist using templates - they've never needed them before, and may consider them an insult, rather than an aid, to their abilities. Many potters will only need to use the templates to measure the first fifty (50) stoves. After that they will only need to check a few stoves each day. If the stoves continue to be correct, then they can check them less often. If there are problems regarding size, the potter should use the templates more.

Cracking of pottery liners must be avoided. The main causes of cracking are weak joints when assembling and rapid, uneven drying. Many cracks may not appear until after firing or even during use - but the weakness was created in the pre-firing stages. Train potters to make strong joints where the tunnel and the door join the firebox. If cracking problems continue, insist that he score the surfaces to be joined. If cracking problems still continue, insist that s/he score and slip (put watery clay) onto the surfaces to be joined.

Distorting or misshaping the circular potholes must be avoided. The major cause of the circle becoming an oval shape is moving the firebox or the second burner onto an uneven surface to dry. The main causes of bumps on the rim are lumps in the coils or lifting the firebox from the top while it is still wet. Help the potter avoid distorting the liners by providing (or selling) the potter sturdy wooden planks that measure 14 by 14 inches. The extra size allows to dor to be added without moving the firebox.

Remember these differences:

While you must respect the skills and traditions of the potter,, you must also understand the invisible science behind the traditions, to be able to introduce something as new and as different as the ceramic stove liner. There are some aspects of the pottery liners that the potter has no tradition for.

1. The firebox and second burner have no bottom.
   a) The walls are much more likely to change shape if they are picked up before they are stiff enough to hold their shape (leatherhard).
   b) Having an uneven floor surface actually helps support the traditional round bottom shapes. But uneven floors greatly distort the bottomless stove liner shapes.
2. Clay pieces are joined at right angles. All the traditional pots, especially the large ones, are single curved walls. The pots are made at one time, not assembled later.

3.

3. The stove liner must be made to exact dimensions in order to work properly. The two parts must fit to gether, and the potholes must properly accomodate the cooking pots. The firebox and tunnel must promote good combustion and transfer of heat.

4. The stove liner will be subjected to much more heat stress in use than the cookpots or water jars. The liner requires more porosity and better fired strength. (The Sri Lankan clay appears to be well suited to stove liners.)

Checkpoints:

When wet, are each of the parts the correct size and shape?

- 8" top diameter on the firebox (inside)
- 10" bottom diameter on the firebox (inside)
- 7" height of the firebox
- 2½" deep door
- 7 height of tunnel
- 3½" x 5" inside the tunnel
- 8" inside diameter of second pothole
- ½" potrest thickness

Are the tunnel, firebox, and door for each stove made at the same time? (If not, they are more likely to crack.)

Is the firebox left to stiffen in good condition, with the top perfectly round?

Are the tunnel and door joined to the firebox with a good, strong joint - so strong that if you pulled them apart, the walls would break instead of the joint?

Before firing, are the potholes perfectly round, and no cracks anywhere?

After firing, are there no cracks? Are the potholes a perfect circle? Are the dimensions the correct size? Does the liner make a ringing sound when you tap on it?

YOU SHOULD ANSWER "YES!" TO ALL OF THE QUESTIONS ABOVE!

Quality Control

Part of the extension worker's job is QUALITY CONTROL. Any problems with the stoves should be caught early, and a systematic approach used to illustrate the cause or causes of the problem to the potter. Only then can you guarantee the full participation of the potter in permanently correcting the production process. This involves a six (6) step process, outlined below with an example following.

Problem Solving

1. Define the problem.
2. Observe carefully the entire production process, covering all possible causes of the problem.
3. Make a good guess at what actions or inactions might be causing the problem.
4. Talk with the potter about the possible causes. Ask the potter what s/he thinks the cause is.
5. Devise a test to scientifically determine and illustrate the causes of the problem. Try to prove and disprove both the potter's and your theories.
6. Alter the production methods to avoid this problem.

•:• •:• •:• •:• •:• •:• •:• •:• •:• •:• •:•

1. Say, for example, that smoke and flames come up around the first pothole. You look closely and define the problem as being that the top of the firebox on many of the stoves is not perfectly round like the cookpots are.
2. You stay with the potter while he makes some stoves. You observe that the final shaping of the top of the firebox is done correctly, and they form a good round circle. You observe that the fireboxes are lifted from the planks the same day they are made and set on the clay floor. The clay floor is not perfectly level, and some of the fireboxes are no longer perfectly round after being moved to the floor.
3. You guess that the uneveness of the floor pushes up parts of the wall of the firebox, and picking up the liners while they are wet stretches the top out of shape. You guess that moving the firebox off the planks they are made on, while wet, changes the round top to an uneven oval shape.
4. You talk with the potter about the problem and the possible causes. The potter says that the deformation happens in the firing. He says that the liners fired in the bottom layer of the kiln bend due to the weight of the liners above them.
5. Now the biggest step: you test these ideas by making marks on the liners to identify them, and treating them differently during production. Keep careful records on paper.
   a) Treat the first 10 liners in the usual way, lifting them from their boards the first day and setting them on the uneven floor. On each stove mark a number, 1,2,3,4, etc., up to 10. Make another 10 liners that are not lifted from their boards until they are leatherhard - the door is added and the tunnel assembled without removing the firebox form the board, and the liner left to stiffen until it is firm. Mark a number on each stove: 11,12,13, 14, etc., up to 20.

b) Be present during the days the liners stiffen and dry. Make sure the stoves numbered 11 through 20 dry to the leatherhard state on their boards. On a sheet of paper, with numbers 1 through 20 on it, write how each stove was treated and any observations regarding how round or how deformed the top of the firebox is at each stage. Record the dates of your observations as well as the dates of construction and assembly.

c) Be present when the potter is ready to load his kiln. Be sure to mark on your paper any stoves which are already deformed. Are stoves 1 - 10 more deformed than stoves 11 - 20? Discuss your observations with the potter. If the stoves 1 - 10 <u>are</u> significantly deformed, and stoves 11 -20 are not, and the potter agrees that picking them up off their boards while wet deforms them, then it is not necessary to fire the deformed ones. Have the potter place half of the 1 - 10 stoves to be fired on the bottom layer of the kiln, and half on the top layers. Have the potter place half of the 11 - 20 stoves on the bottom layer, and the other half on the top. Be sure to mark on your paper next to each number whether that stove was rejected, placed on the bottom layer in the kiln, or placed on the top, or middle layers of the kiln.

d) Be present when the potter unloads the kiln. Discuss with the potter the condition of the stoves. Did any of the 11 - 20 stoves fired on the bottom layer of the kiln get deformed into an oval shape? Mark the paper. Is there any difference between the 1 - 10 bottom layer stoves and the 11 -20 bottom layer stoves? Small deformations may increase under the weight in the kiln, but a careful study would have to be done to prove this. Of the 11 - 20 stoves, are the ones placed on the bottom consistently more deformed than the ones placed in the top layers of the kiln? If so, then placement in the kiln is a cause of the problem. If not, then the potter should understand that that kiln placement is not a cause of the problem. Are the 1 - 10 stoves consistently more deformed than the 11 - 20 stoves? If so, then keeping the wet clay firebox on its board until it is leatherhard is important in eliminating the problem of deformation. Analyse the test results with the potter.

6. Alter production to eliminate the problem. If the movement of wet fireboxes proved to cause deformation, then you must alter methods to enforce that the fireboxes stay on their boards from coiling to assembly to leatherhard state. If the kiln placement is (also) a problem, then production costs will rise considerably. Either the potter only fires them on the top layer in the kiln (reducing the number of stoves he can produce) or, he fires only one or two layers of stoves at a time, increasing the time and fuelwood spent on each liner.

Other Issues

Altering the clay mix: Changing the potter's clay is possibly a solution to the problem of cracking. But it should only be tried after all other options have failed to solve the problem. Try first a) improving the joints between pieces and coils;
b) careful firing and cooling;
c) very careful handling of wet and dry liners.
It is very difficult to select clay mixes. If you continue to have cracking problems, you may require some heat-resistant material with large particle sizes to be added to the clay: either sand, mica, or grog (crushed pottery). Make sure that what you add is clean and free of salt, (ocean sand must be washed), and free of dust-sized particles, as these will reduce plasticitly without helping your cracking problem. A 20% (twenty percent) proportion of sand, mica, or grog is usual for clay used in stoves..

Kilns and firing methods: The firing techniques in Sri Lanka are quite good. Changing firing techniques is extremely difficult. If many stoves are poorly fired, the potter may be taking shortcuts to save fuelwood or time. Before buying any stove liner, tap on it with your finger. Listen for a good ringing sound - on all parts of the stove. This indicates it was evenly fired to a high enough temperature. If you instead hear a dull "thud" sound, then do not buy the liner. Insist that it be refired. This is an essential part of quality control. If proper firing of liners is not important to you, it will cease to be important to the potter.

Money: You must make money arrangements with the potter before you begin to work. During the training period, the potter will be spending alot of time learning how to make proper liners. Settle with him/her in advance how you will pay for this time: how many rupees for a perfect stove, how many for an imperfect stove, how many rupees, if any, for a rejected stove. Once out of the early training period, however, you should only buy the high-quality liners. Settle on a price that is fair: that encourages the potter to make liners, but not much more than s/he makes with other pottery. Keep agreements clear, quality control strict and consistent, and communication constant. Remember that making perfect liners requires boards for each firebox for about 4 days (depending on weather conditions) and more storage space than traditional pottery requires. A cost analysis (for twenty (20) stove liners) follows:

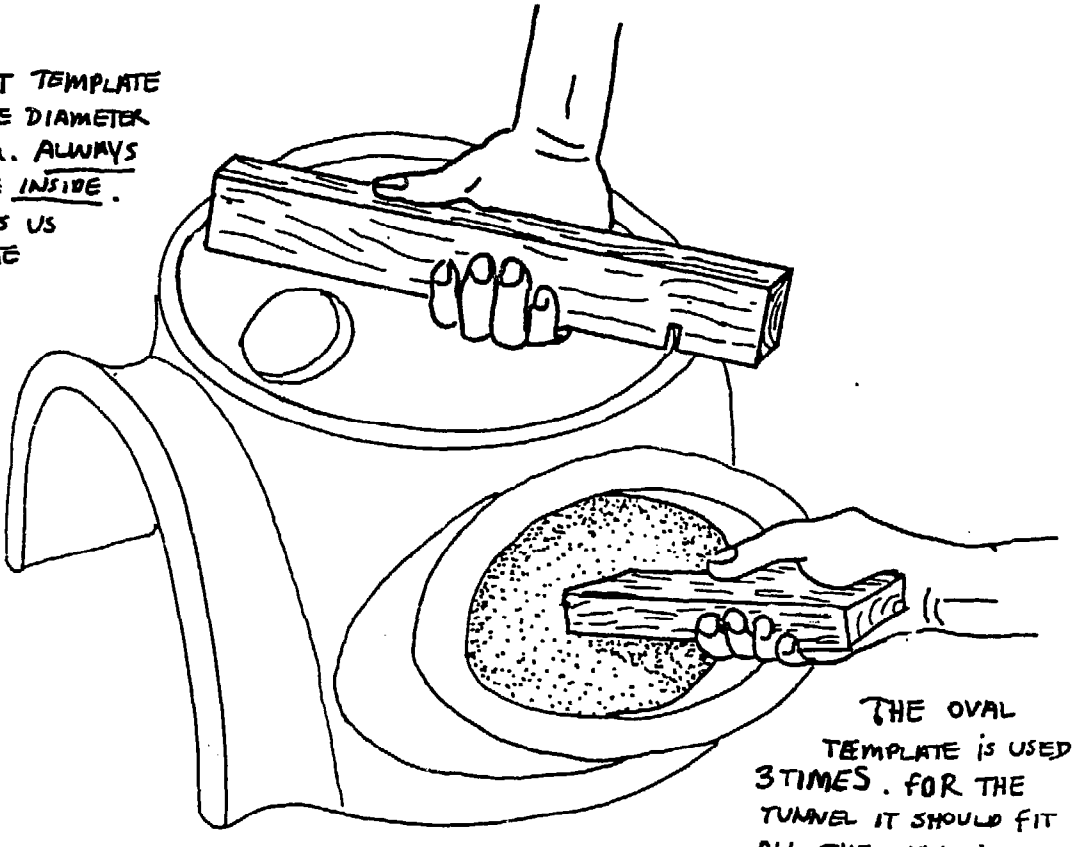
- clay	landowner	30
	digging labour	10
	transport	20 *
	mixing labour	25
	water	2.50
- forming	labour: making coils	
	making pieces	100
	assembly	
	skill training time	
	space for work, storage, and boards	3
-firing	firewood	50
	time and skill, firing	75
	kiln building, maintainance	40
		355.50

Rs. 355.50 ÷ 20 stoves = Rs. 17.7 each, or about 18.
*(It should be noted that transportation cost of clay will vary from potter to potter, and the marketing system used will affect the final price of the stove liner.

GETTING THE MEASUREMENTS RIGHT

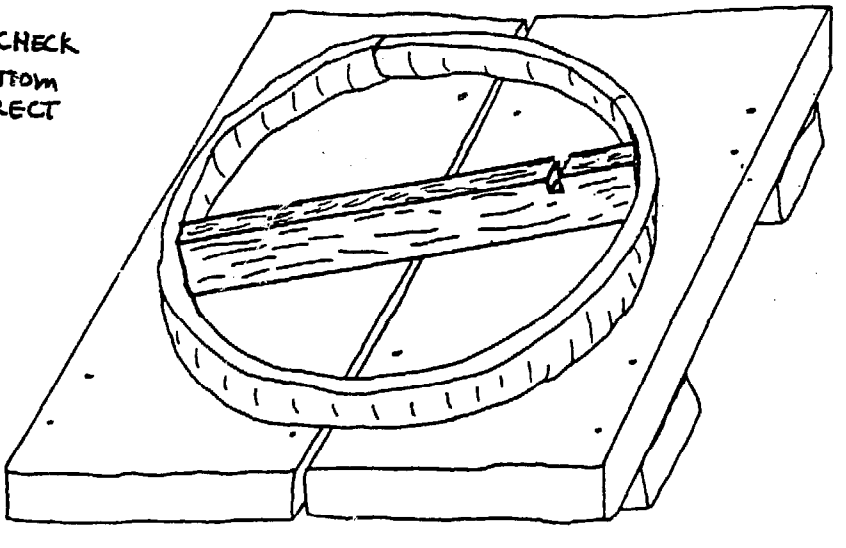
THE TEMPLATES: USE ON WET STOVES ONLY (AS THE STOVE IS BUILT)

THE STRAIGHT TEMPLATE MEASURES THE DIAMETER of THE FIREBOX. ALWAYS USE IT ON THE INSIDE. THE CUT SHOWS US HOW WIDE THE TOP SHOULD BE.

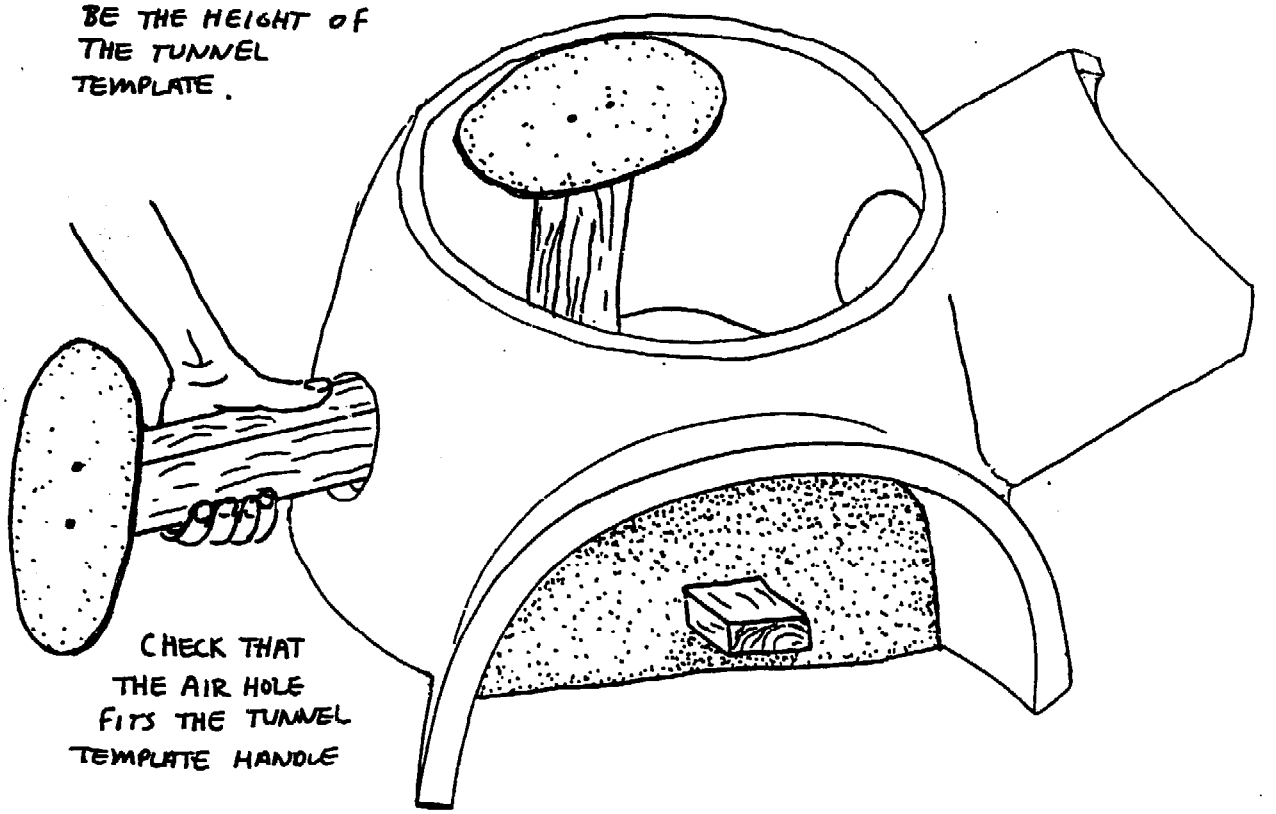


THE OVAL TEMPLATE IS USED 3 TIMES. FOR THE TUNNEL IT SHOULD FIT ALL THE WAY IN.

FIRST YOU CHECK THAT THE BOTTOM IS THE CORRECT SIZE.

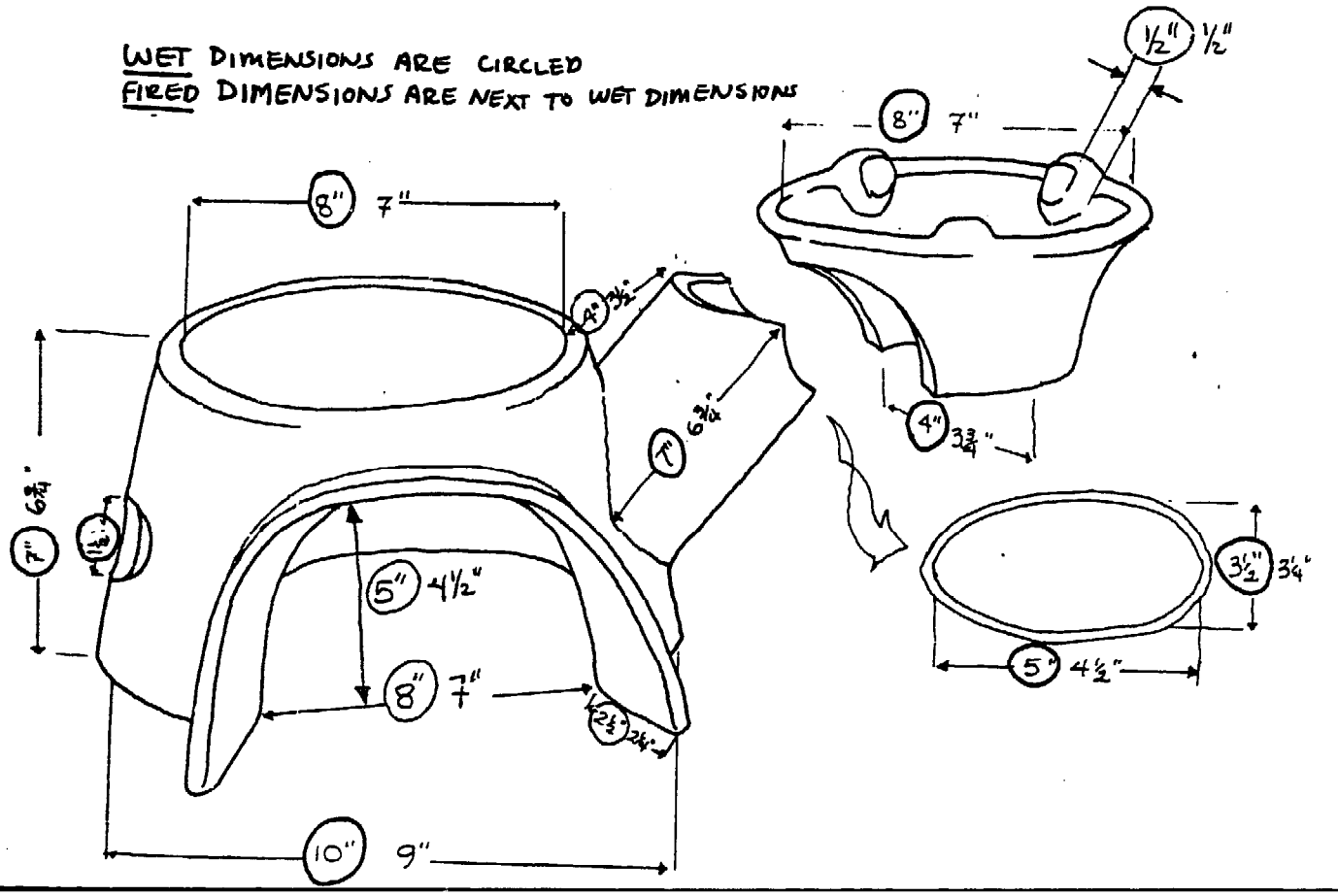


THE FIRE BOX MUST BE THE HEIGHT OF THE TUNNEL TEMPLATE.

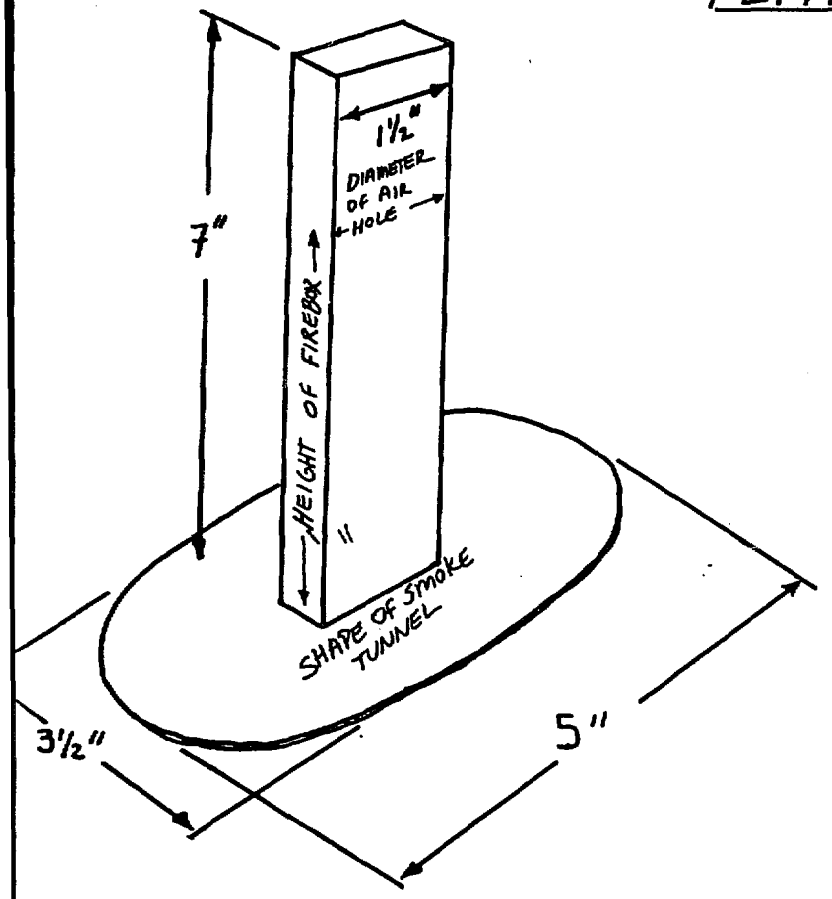


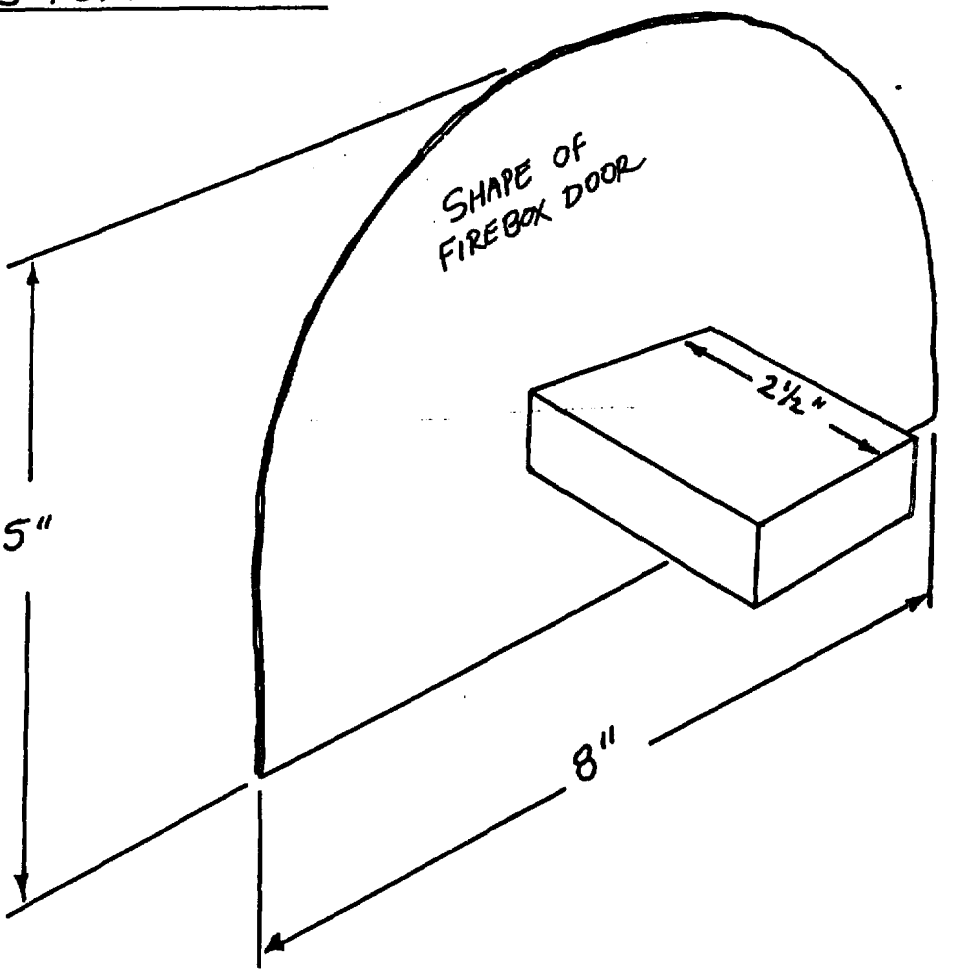
CHECK THAT THE AIR HOLE FITS THE TUNNEL TEMPLATE HANDLE

WET DIMENSIONS ARE CIRCLED
FIRED DIMENSIONS ARE NEXT TO WET DIMENSIONS

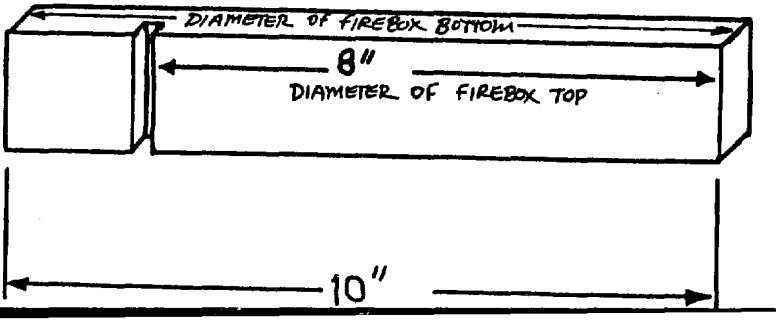


TEMPLATES FOR POTTERS





THESE TEMPLATES ARE TO BE USED AS THE POTTER MAKES THE STOVE. SINCE STOVES SHRINK AS THEY DRY, THEY CANNOT BE USED WITH DRY OR FIRED STOVES.



APPENDIX 5

OBSERVATION SHEET

	Inches	Too big or too small?	Effect
Height of fire box			
Diameter of Fire box			
Height of door			
Width of door			
Depth of door			
Size of air hole			
Distance of air hole from ground			
Distance between pot holes			
Diameter of Second Pot			
Height of Pot supports			

Are the pot holes round? What is the effect?

First _____

Second _____

Is the tunnel attached to the second pot hole well? What is the problem _____

_____

Is the soil mix on the stove smooth and hard? YES NO

What happens if it is too soft? _____

_____

Are there any major problems with this stove? _____

_____

_____

_____

Observation Sheet-
Sinhalese version

ලිප් පරීක්ෂාකරණ ආකෘති පත්‍රය.

	ඔව්.	නැත් විශාල හෝ ශූන්‍ය කුඩා.	ප්‍රතිඵලය.
ගිනි දැල් වෙන ස්ථානයේ උස.			
ලිප් සිදුරේ මුදුනත විෂ්කම්භය.			
දර දමන කවුළුවේ උස.			
දර දමන කවුළුවේ පළල.			
එා කවුළුවේ ව්‍යාලත්වය.			
බිම සිට එා කවුළුවට දුර ප්‍රමාණය.			
පළමු ඝාජනයට දෙවෙනි ඝාජනයේ සිට දුර.			
දෙවෙනි සිදුරේ විෂ්කම්භය.			
වලද ආදාරක වල උස.			

ලිප් සිදුරු වටකුරුද? ප්‍රතිඵලය කුමක්ද?

පළමු වැන්න.....

දෙවැන්න .....

බිංගෙය දෙවැන්න ලිප් ස්දුරට හොදට සවි වී ත්බේද? ප්‍රශ්නය යුමක්ද?.....

....

ලිප් මුදුනත මැටි මිශ්‍රණය මෘදුද-තදද? සවි. තැහැ.

එය ශූන්‍ය මෘදු නම් කුමක් ස්දු වේද?.....

.....

මෙම ලිප පිළිබඳව හොඳේ ප්‍රශ්න තව දුරටත් ත්බේද?.....

.....

APPENDIX 6

FOLLOW UP

INTRODUCTION

What we mean by "Follow-Up"

Follow up means checking on progress and problems of people you have trained. Even a test at school is a type of follow up; your teacher is checking on your progress and problems.

Why do Follow-Up?

1. To help people in the field. When you check on potters and installers your first concern is to help them do a better job. Often people will not tell the installer of problems beacuse of politeness or not knowing that their stove could be better. Always be thinking of how to help people do their jobs more easily and higher quality.

2. To get information back to trainers and planners

   You will look for problems which could be solved by better training, or a different approach. Is the installer working in too large an area? Are the installers trained to tell the women to maintain their stoves? By doing follow up you can make sure that the system is working all the way to getting stoves into houses.

3. When to do follow up.

   You should check in the field before small problems become large problems. For installers after they have installed 10 or 20 stoves you should check on quality. If there are important mistakes the installer should be instructed immediately. Of course, any poor quality stoves should be fixed or replaced.

   After solving early problems you should check on the installer after 3-6 months to assure that quality is still high, and correct any bad habits.

Followup - Lecture Notes
Sinhalese version

අනුගමනය වැඩපිළිවෙල හැඳින්වීම

අනුගමනය වැඩපිළිවෙල යනුවෙන් අප අදහස් කරනුයේ කුමක්ද?

අනුගමනය වැඩපිළිවෙල යනුවෙන් අදහස් කරනුයේ ප්‍රගතිය සහ යම විසින් පුහුණු කරනු ලැබුවන්ගේ ගැටළු පරීක්ෂාකර බැලීමය. පාසලකදී කරනු ලබන පරීක්ෂාවන් වුවද එක්තරා ආකාරයක අනුගමනය වැඩපිළිවෙලකි. යමගේ ගුරුවරයා විසින් යමගේ ප්‍රගතිය හා ගැටළු පරීක්ෂා කරයි.

අනුගමනය වැඩපිළිවෙලෙන් අවශ්‍ය වන්නේ ඇයි?-

1. **ඉගෙනුමේදී ශිෂ්‍යයන්ට උදව් කිරීමට.**

   යම ලිප් සාදන්නන් සහ ඒවා සවිකරන්නන් පරීක්ෂා කිරීමේදී යමගේ ප්‍රධාන අවධානය යොමුවිය යුත්තේ යවුන්ට හොඳ ලිපක් සෑදීමට උදව් කිරීමටය. බොහෝවිට ශිෂ්‍යයන් යවුන්ගේ ප්‍රශ්න ලිප් සවි කරන්නන්ට යවුන්ගේ ගොඳගිය පවත්වා ගැනීමට හෝ යවුන්ගේ ලිප හොඳට ක්‍රියාකාරී වේය යන්න ගැන තොදතම නිසා එම ප්‍රශ්න කිරීමට අකමැති වේ. නිසැකවම ඔහුගේ ශිෂ්‍යයන්ට යහුගේ වැඩය බොහෝ පහසුවෙන් හා ඉක්මන් හොඳ තත්වයෙන් නිමා කිරීමට උදව් කරන්නේ කෙසේද යන්න ගැන සිතා බැලිය යුතුය.

2. **පුහුණු කරන්නන්ට සහ සැලසුම් කරන්නන්ට ආපසු පොරතුරු ලබා ගැනීම:-**

   යම හොඳ පුහුණුවකින් හෝ වෙනත් ක්‍රමයකින් විසඳා ගැනීමට ඇති ගැටළු ගැන බලාපොරොත්තුවිය සිදු වේ. ලිප් සවි කරන්නා විශාල ප්‍රදේශයක ලිප් සවි කිරීමේ නියැලී සිටීද? ලිප් සවිකරන්නන් ගෘහණියන්ට යවුන්ගේ ලිප් නඩත්තුව ගැන උපදෙස්දීමට පුහුණුව ලබා තිබේද? මෙම අනුගමනය වැඩපිළිවෙල ක්‍රියාත්මක කිරීමේ වැඩසටහන ක්‍රමය අනුව කොහෝ තිවෙස් වලට ලිප් ලබාදීමේ විශ්වාසය ඔබට ඇතිවෙනු ඇත.

3. **යම අනුගමනය වැඩපිළිවෙල කරනුයේ කවදාද?**

   යම ශෙනුමේ පරීක්ෂාකල යුත්තේ කුඩා ගැටළු විශාල ගැටළු බවට පත්වීමට පූර්වයෙන්ය. ඒවායේ සැලකිය යුතු ගැටළු ඇත්නම් ඒ වහාම ලිප් සවි කරන්නාට දැනුම්දිය යුතුය. ඇත්ත වශයෙන්ම විය යුතුව ඇත්තේ හි නුසුදුසු තත්වයේ වැරදි ඇති ලිප් තිවැරදිව සවි කිරීම හෝ ඒ වෙනුවට වඩාත් හොඳ කාර්යක්ෂමතාවයකින් යුත්තට ලිපක් සවිකර දීමය.

   මූලික ගැටළු විසඳීමෙන් පසු යම විටින් ලිප් සවි කරන්නා මාස 3 කට හෝ මාස 6 කට පසුව ඒවායේ තත්වය තවදුරටත් උසස්ව තිවැරදිව හෝ නුසුදුසු තත්වයේ තිබේද යන්න ප්‍රධාන දෙය - ගැනීම පිණිස පරීක්ෂාකල යුතුය.

APPENDIX 7

STOVE INSTALLATION FOLLOW UP FORM

DATE: _____ OBSERVER: _____ INSTALLER: _____

DATE OF INSTALLATION _____ NUMBER OF PEOPLE COOKED FOR _____

VILLAGE NAME _____ FAMILY NAME _____ TIME _____ AM PM

TYPE OF STOVE _____

LOCATION (Floor, Corner, on table?) _____

QUESTIONS TO ASK THE COOK

1. Does the Stove help you? _____YES _____NO HOW? _____
2. What problems do you have with the stove?

   Lighting the fire _____YES _____NO

   Using more wood _____YES _____NO

   Using all size pots _____YES _____NO

   Slower than open fire _____YES _____NO
3. What do you use the stove for? _____All Cooking, _____ Everything except tea _____ Only for some cooking _____ Not at all
4. Did you collect materials for the installation? _____ YES _____NO

   Did the installer request that materials be ready? _____ YES _____NO
5. How much did the Stove Liner and Installation cost? _____
6. Is the work done well or poorly? Why? _____

   _____
7. What were the installers instructions for repair and maintenance?

   _____

   _____
8. How often do you smear the stove? _____

   _____

cont'd .....

Stove Installation Follow Up Form (cont'd)

9. Do you _____ Buy and /or _____Gather firewood? How many times is wood gathered per week? How many Rupees per week do you spend on firewood?

_____

_____

10. Other comments from the cook _____

_____

_____

OBSERVATIONS

1. Is the stove warm? _____YES _____NO

2. Is the stove kept clear of ashes? _____YES _____NO
   Is the tunnel clean? _____YES _____NO

3. Is the stove well cared for? Is it well smeared? _____

_____

4. Is the stove in a good location? _____

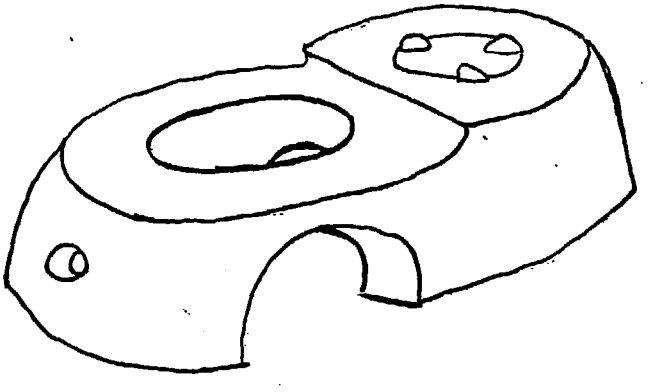
5. Is the second pot hole correctly positioned? _____

6. Is the secondary air hole correctly positioned? _____

7. Is the mix covering the liner well smoothed and shaped? _____

8. Does the mix crumbel when you rub your thumb on it? _____YES _____NO
   WHY? _____

9. Point out where any cracks or problems are on the stove.



(write additional comments on back side of this sheet)

ලිප් සැකසීමේ ඇගයීම් පිලිබඳ පත්‍රිකාව.

දිනය.................. පරීක්ෂාකරන්නාගේ නම.........................ලිප සෑදූ අයගේ නම.
.....................ලිප සකස් කල දිනය.........................ගෘහයේ පදිංචි සංඛ්‍යාව
.....................ගමේ නම..................... ගෘහ මූලිකයාගේ නම.........
.... වේලාව..පෙ.ව. ප.ව...............ලිප් වර්ගය..............
ලිප සාදා ඇති ස්ථානය.(බිම. මුල්ලක.උස් ස්ථානය.(පෝරනුවක)...........................
ග

ගෘහනිකගෙන් ඇසිය යුතු ප්‍රශ්න.

1.මෙම ලිප ඔබට ප්‍රයෝජනවත්ද? ඔව්. .... නැත. .... කෙසේද..............

2.ලිප පාවිච්චියේදී ඇති බාධක මොනවාද?

ගිනි දැල්වීමේදී. ඔව්........... නැත.............
දර වැඩිපුර වැය වේද? ඔව්.......... නැත...........
සෑම ප්‍රමාණයකම භාජන පාවිච්චි කරනවාද? ඔව්........... නැත..........
පාරම්පරික ලිපට වඩා වැඩි වේලාවක් ගත වේද? ඔව්.......... නැත............

3.ලිප පාවිච්චි කරන ආකාරය.-සියළුම කෑම පිසීම සඳහා....................
-සියළුම කෑම වර්ග පිසීමට (තේ හැර)...........
-ආහාර වර්ග කීපයක් පිසීම සඳහා...............
-පාවිච්චි නොකරණ.......................

4.ලිප සකස් කිරීමට මිශ්‍රණයට අවශ්‍ය ද්‍රව්‍ය ඔබ එකතු කලාද? ඔව්.......... නැත...........
ලිප සකස් කරන්නා අවශ්‍ය දෑ රැස්කිරීමට ඉල්ලීමක් කෙලේද? ඔව්.......... නැත..........

5.ලිප සකස් කිරීම සඳහා සම්පූර්ණ වියදම..........................

6.ලිප සවි කිරීම සිදු වූ අයුරු. සාර්ථක ලෙසද? අසාර්ථක ලෙසද? එසේ නම් හේතු..............
....

7.ලිප අලුත් වැඩියා කිරීම සඳහා දිගු කල් පැවැත්ම සඳහා ලැබූ උපදෙස් කවරේද?...............
....

8.ලිපෙහි ගොම මැටි ගෑම කරනුයේ කවර අන්දමකින්ද? උදා.දෙසතියකට වරක්..............
මාසිකව...................

9.දර ලබා ගන්නා ආකාරය.-මිලදී ගැනීම.ඔව්.......... නැත.........
-සතියකට දර සඳහා වැය කරන මුදල.............
-එකතු කර ගනීද?...ඔව්.......... නැත..........
-සතියකට කී වතාවක්ද................

10.ලිප පිලිබඳව ගෘහනියගේ අදහස් සහ යෝජනා...................................
....
....

ලිප පරීක්ෂා කිරීම.

1. ලිපේ ස්වභාවය. උකුසුසුම්ව ඇත........... නැත...........
2. ලිපෙහි අළු පිරී ඇත.......... නැත..........
3. බිංගෙය පිරිසිදුව ඇත.......... නැත...........
4. ලිපෙහි පවතින ස්වභාවය කෙසේද? ....
ලිග පිරිසිදුව තබා ගන්නේද? ඔව්...... නැත........
5. ලිප සාදා ඇති ස්ථානය සුදුසුද? නුසුදුසුද?.................

6. දෙවන භාජනය පාවිච්චි කිරීමට ලිප් සිදුර නිවරදිව සකසා තිබේද?......................

7. එය කවුළුව නිවරදිව සකසා තිබේද?..

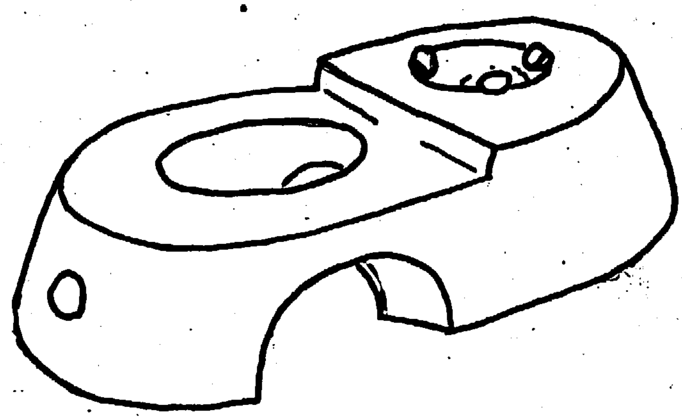
8. ලිපෙහි නිමාව.(හැඩ ගැන්වීම.සහ මැදීම සඳහා ගත් මිශ්‍රණය හොඳද?...................

....

9. මිශ්‍රණයේ හැකිලීම් පවතීද? ඔව්............ නැත.......... විස්තර දක්වන්න..........

....

10.ලිපෙහි පිපිරීම් සහප්‍රශ්ණ ඇති ස්ථාන රූප සටහනේ ලකුණු කරන්න..



11. මේ පිලි බඳව ඔබගේ වෙනත් අදහස් සහ යෝජනා පසු පිටෙහි සඳහන් කරන්න.

Appendix 8

QUIZ FOR FINAL DAY OF COURSE

Answer these questions:

NAME:

1. Why are we working with improved cookstoves?

2. What are the advantages of cooking on

An Open Fire	An Improved Cookstove

3. Name 3 problems caused by destroying Sri Lanka's forest.

4. Write in the proper wet dimensions of the stove.

5. Name 2 ways to ensure that the front pot seat is flat and round.

cont'd ....

Quiz for final day of Course (cont'd)

6. What is one common fault with the back pot seat?

7. If a potter asks for payment for badly built stoves, what would you say?

8. List the materials and quantities required to install a stove, except liner and water.

   1. _____

   2. _____

   3. _____

   4. _____

9. What questions should you ask a householder before installing a stove?

10. What happens if you don't use enough sand in the mix for installing?

11. Why would smoke come out of the firebox door if the second pot is high enough?

Quiz for final day of Course (cont'd)

12. What problems are caused by non-round pot holes?

13. What are <u>two</u> possible causes of a slow smoky fire?

14. How long after training do you carry out the first follow-up of an installer?

15. If someone says they like the stove and use it all the time, what should you check?

Appendix 8

Quiz -
Sinhalese Version

සර්වෝදය ශ්‍රී ලංකා විදුලිබල මණ්ඩලය (බලශක්ති) හා ඒකාබද්ධ
ශක්ති පිරිමැස්මේ දර ලිප් පිළිබඳ පාඨමාලාව (දෙසති)
1986 අගෝස්තු අවසන් පරීක්ෂණය

නම:- .... ලිපිනය:- ....
....

පහත සඳහන් ප්‍රශ්න වලට පිළිතුරු සපයන්න. (කාලය පැය 1 යි)

01. අප දියුණු කල වඩාත් කාර්යක්ෂම දර ලිප් පිළිබඳව වැඩ කරන්නේ ඇයි?

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02. පහත සඳහන් ලිප් වර්ග පාවිච්චි කිරීමෙන් ඇති වාසි මොනවාද?

පාරම්පරික ලිප	කාර්යක්ෂම දර ලිප
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03. ශ්‍රී ලංකාවේ වන සම්පත විනාශ කිරීමේ හේතුවෙන් අපට මුහුණපෑමට සිදුවී ඇති ප්‍රශ්න 3 ක් සඳහන් කරන්න.

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04. වලං මැටි ලිපක් (වලං කාර්මිකයා සමග) සකස් කිරීමේදී භාවිතා කල යුතු නිවැරදි මිනුම් සඳහන් කරන්න. (පිළිතුරු ලිවීම සඳහා පසුපිටේ අමුණා ඇති රූපසටහනද උපයෝගී කරගන්න)

05. ලිප් සිදුර නිරියාකාරව රවුම්ව සහ භාජන පාවිච්චියට ගැලපෙන අයුරින් සකස්වී ඇත්දැයි පරීක්ෂාකල හැකි ක්‍රම 2 ක් සඳහන් කරන්න.

....
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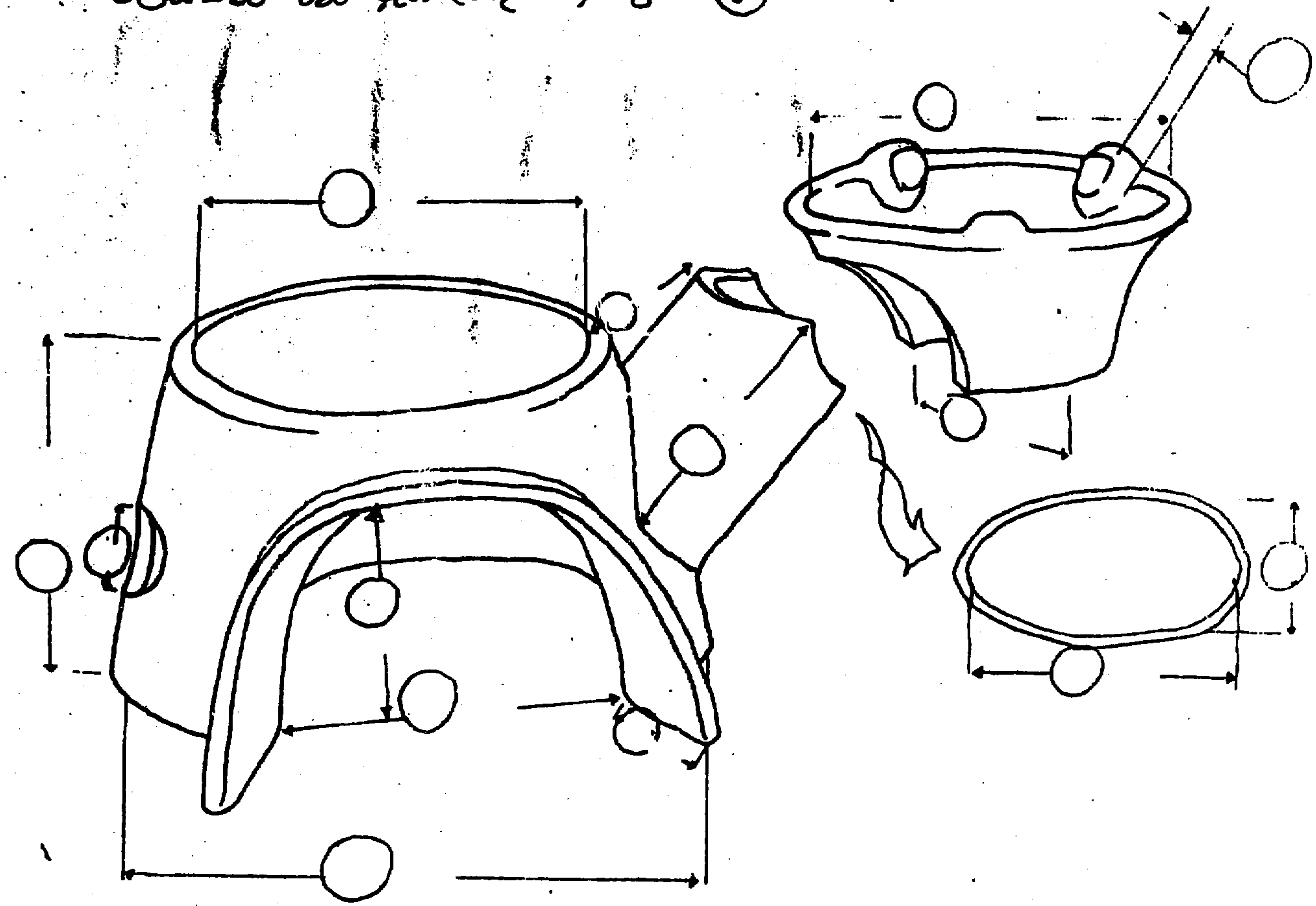
[illegible] සඳහා [illegible] [illegible] සහ [illegible]. [illegible] [illegible] [illegible].
[illegible] [illegible] [illegible] (සෙන්ටිමීටර) මිනුම් [illegible] කර ඇත.



06. ඔබේ අදහස් අනුව දෙවන භාජනය පාවිච්චි කරනු ලබන ලිප් සිදුරේ දැකිය හැකි පොදු වැරැද්ද කුමක්ද?

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07. පාවිච්චියට ගත නොහැකි වලං මැටි ලිප් සඳහා වලං කාර්මිකයා මුදල් අල්ලන විට පිළිතුරු එයගෙන් යන කුමක් කියන්නේද?

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08. ලිපක් මැටි ගැසීමේදී ගනු ලබන ද්‍රව්‍යයන් සහ ප්‍රමාණයන් පිළිබඳ ලැයිස්තුවක් සකස් කරන්න.

I. ....

II. ....

III ....

Iv ....

09. ලිපක් මැටි ගැසීමට පළමු ගෘහ මූලිකයාගෙන් යන ඇසිය යුතු මූලික කරුණු මොනවාද?

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10. ලිපක් මැටිගැසීමේදී යොදා මිශ්‍රණය සඳහා ප්‍රමාණවත් තරම් වැලි ප්‍රමාණයක් නොයෙදීමෙන් කුමක් වන්නේද?

....

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11. දෙවන ලිප් සිදුර ප්‍රමාණවත් උසකින් සහ තිරස්කාරව සකස්කර තිබියදී [illegible] දුම් පිටවන්නේ ඇයි?

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12. තිරියාකාර හැඩයක් නැති සිදුරු සහිත ලිපක් පාවිච්චි කිරීමේදී ඇතිවන ප්‍රශ්න මොනවාද.

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13. ලිප පාවිච්චියේදී දුම් සහිත සෙමින් ගින්න දැල්වේ. හේතු 2 ක් දක්වන්න.

I. ....

II. ....

14.

14. ඔබේ නිවෙස්වල සත්කාරකයෙකු පිළිබඳව පැල්ලුමෙන්ම යම් රෝගයක් ඇතිය යුත්තේ පුසුලුවෙන් කොපමණ කාලයකට පසුවද?

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15. ඔබේ පාට්ටි කන්නෙකු ලිපට පසාත් කැමති ගැටත් නියරම පාට්ටි කතා කරන්නේ සඳහන් කරයි. එවිට ඔබ විසින් පරීක්ෂා කළ යුත්තේ කුමක්ද?

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එල්/ කේ

QUESTIONNAIRE FOR COURSE EVALUATION

SARVODAYA/CEB TRAINING COURSE AUGUST 1985

This questionnaire is designed to help us plan future training courses so you honest comments will be appreciated. The answers will be used only to improve the next training course so you do not need to put your name on this paper and it will not affect your certificate for the course.

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1. How was the length of the course? (tick one)
   _____ too long
   _____ O.K.
   _____ too short

2. How was the amount of work? (tick one)
   _____ too much
   _____ O.K.
   _____ too little

3. How was the amount of lectures compared with practical work? (tick one)
   _____ too much talking
   _____ O.K.
   _____ too much practical

4. How was the amount of discussion?
   _____ too much
   _____ O.K.
   _____ too little

5. The course included theory. Was it
   _____ too much theory
   _____ O.K.
   _____ too little theory

6. There were four main subjects to the course. Put a tick by any subject with which you had problems during the course.

   _____ Working with Potters
   _____ Installation
   _____ Fault Finding
   _____ Follow up

cont'd ....

Questionnaire for Course Evaluation (cont'd)

7. Do you think some things were not necessary? If so, what?

8. Do you think some things should be added or more time spent on them? If so, what?

9. Say how you think the course can be improved.

ශක්ති පිරිමැස්මේ දර ලිප් පිළිබඳ පාඨමාලාව – 1985 අගෝස්තු

සර්වෝදය ශ්‍රී.ලං.වි.ම. (බලශක්ති ඒකකය) හා ඒකාබද්ධව

පාඨමාලා ඇගයීම:-

මෙම ඇගයීම් පත්‍රිකාවෙන් අප බලාපොරොත්තු වන්නේ අපගේ ඉදිරි වැඩසටහන් ක්‍රමවත් කරගැනීම බැවින් පාඨමාලා ලාභීන්ගේ අවංක අදහස් සහ යෝජනා ඉතාමත් අගේකොට සලකමු. ඔබගේ පිළිතුරු හැබවින්ම අප ලබා ගනුයේ ඉදිරි වැඩකටයුතු සාර්ථක කරගැනීම සඳහා පමණි. එබැවින් ඔබගේ නම සඳහන් කිරීම අවශ්‍ය නැත. පාඨමාලාව සහ සහතික පත්‍ර බෙදාදීම පිළිබඳව මෙහි කිසිදු සම්බන්ධයක් නැත.

කාලය විනාඩි 30 යි (ඉදිරියේ ඇති කොටුවේ තමාගේ කැමැත්ත අනුව ✓ ලකුණ යොදන්න)

01. පාඨමාලා කාලය
- ☐ ඉතාමත් වැඩිය.
- ☐ ප්‍රමාණවත්ය.
- ☐ ඉතාමත් කෙටිය.

02. පාඨමාලාවේ වැඩමුළු ප්‍රමාණය
- ☐ ඉතාමත් වැඩිය.
- ☐ ප්‍රමාණවත්ය.
- ☐ ප්‍රමාණවත් නොවේ.

03. දේශන හා සංසන්දනය කිරීමේදී ප්‍රායෝගික වැඩසටහන්වල ප්‍රමාණය
- ☐ දේශන වැඩියි.
- ☐ ප්‍රමාණවත්.
- ☐ ප්‍රායෝගික පුහුණු වැඩියි.

04. සාකච්ඡා කල කාලය
- ☐ ඉතාමත් වැඩියි.
- ☐ ප්‍රමාණවත්.
- ☐ ප්‍රමාණවත් නොවේ.

05. පාඨමාලාවේ න්‍යායික දැනුම
- ☐ ඉතාමත් වැඩියි.
- ☐ ප්‍රමාණවත්.
- ☐ ප්‍රමාණවත් නොවේ.

06. පාඨමාලාවේ විෂයයන් 4 ක් තිබුණි. ඉන් ඔබට ප්‍රයෝජන ඇති විෂයයන් සඳහා ✓ ලකුණින් පෙන්වන්න.
- ☐ වලං කාර්මිකයින් සමඟ වැඩ කිරීම.
- ☐ ලිප් සැකසීම. (මැටි සැකසීම)
- ☐ ලිප්වල වැරදි ලකුණු කිරීම.
- ☐ අනුගමනය වැඩපිළිවෙළ.

07. පාඨමාලාව විෂයට අදාල නොවන අනවශ්‍ය කොටස් තිබුනේද? එසේනම් ඒ මොනවාද?

08. පාඨමාලාවේ ඇතුළත් කාරණයන් ගෙන සාකච්ඡා කලයුතු සහ අදහස් දැක්විය යුතු කොටස් තිබුනේද? එසේනම් ඒ මොනවාද?

09. විෂය මාලාව සාර්ථක කරගැනීමට ඔබේ අමතර අදහස් හා යෝජනා දක්වන්න.

Appendix 10

Compilation of Trainees' Evaluation Sheets

Sri Lanka Training - Aug. 1985

Question	Number of People Giving These Responses		
	Too Much	Enough	Too Little
1. Total time of training ?	0	9	2
2. Total amount of work ?	0	10	1
3. Too much theory ? (over practical)	4	7	0
4. Time for discussion ?	0	6	5
5. Information presented on theory ?	0	8	3

6. Which subjects were there problems with?

working with potters	4
installing	3
troubleshooting	2
followup	2
none	3

(one person indicated problems with <u>all</u> subjects)

Essay questions

7. Were there any unnecessary parts of the training? Which?

* Sometimes the lectures would go off the topic; sometimes the lectures didn't finish. (4)
* No unnecessary parts. All subjects important. (4)
* Sometimes too much time spent on examples, thus we lost our attention. (1)

8. Were there parts which needed more time spent on them?

* Firing of pottery liners, kiln placement (3)
* Practice making pottery liners (3)
* Production of pottery liner (2)
* Scientific details of combustion, fire, fuels (2)
* Training well organised, lectures okay (2)
* Followup ideas (1)
* Selection of, and mixing, pottery clay (1)
* Installation materials, working with clay from many areas (1)
* Doing cooking tests, in the field (1)
* Use and maintainance of stoves for housewives (1)
* General need for more discussion (1)

9. What are your ideas on how to make future trainings succeed?

* Include more practical experience, especially in making the pottery liners, mixing clay, and loading the kiln (5)
* Include more group discussion (5)
* More free time in evenings to study, exchange ideas (3)
* Better translation (2)
* Quieter environment (2)
* Select trainees with common knowledge, and look at trainees' personal character (1)
* Shouldn't force people to go to Family Gatherings (1)