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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 pictorial 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 in 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 not 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 transportation 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.

TIMETABLE

<u>WEEK 1</u>	<u>LECTURERS</u>
<u>Day 1 - Monday</u> a.m. Introduction - people - description of SSM & CEB programs Why the stove is designed like it is - technical aspects - Socio economic aspects p.m. How the stove works (demonstration - cooking lunch) Design and effect of changes on stove performance	Secretary, Min. of Power & Energy Prof. K. Perera Lamasena Bandara Lamasena J. Loose
<u>Day 2 - Tuesday</u> Pottery materials: clay, clay preparation Introduction to making stoves forming and joining drying and shrinkage firing theory (demonstrations and theory)	L. Childers
<u>Day 3 - Wednesday</u> a.m. Visit to pottery at Wallalla 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)	Lamasena Supervised by Lamasena or Bandara
<u>Day 4 - Thursday</u> a.m. Assembly of stove parts p.m. Reviewing construction	L. Childers L. Childers
<u>Day 5 - Friday</u> 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 2LECTURERS

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

Appendix 2

CLAY AND CERAMIC LECTURE NOTES
Laurie Childers ITDG

Sri Lanka CEB/Sarvodaya Training Day 2
15 August 1985

Today we want to increase your understanding of clay, what it is and what happens to it between taking it out of the ground and becoming a finished stove liners

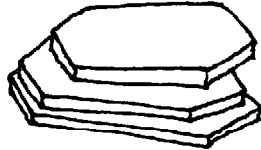
What is clay?

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

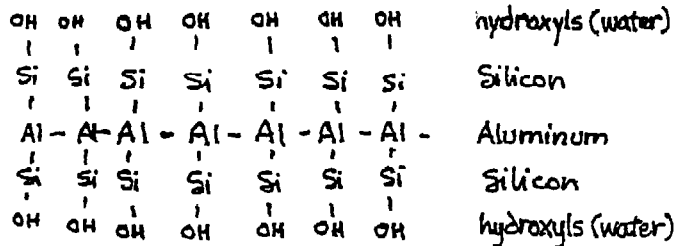
Clay comes from weathered rocks. When rocks are exposed to sunshine, to heat and cold, to rain and ice, they decompose, or break down into small particles. This is usually a very slow process, and some rocks take much longer to decompose than others. Some rocks break up rather easily, and get carried 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 in place. 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 particles 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

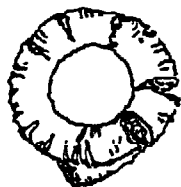


chemical structure of clay (simplified)

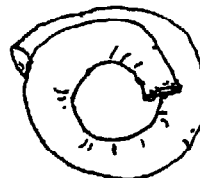
Clay particles are hydrated, that is, they are chemically bound to water. Even after clay has dried in the sun, there is still water between the the clay particles. This bonded water sticks to other water, and so the particles of wet clay are both attached and lubricated by the water between them. The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

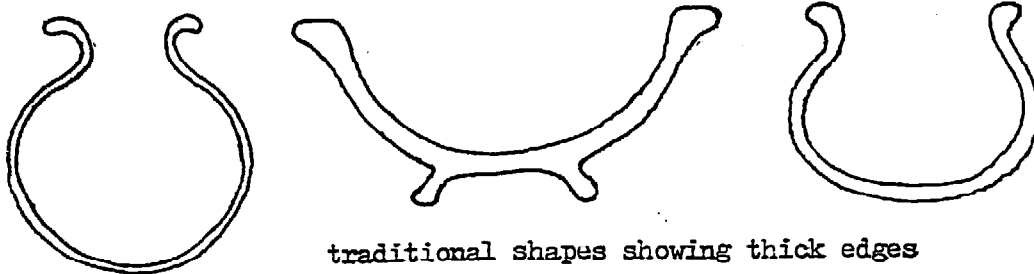
One of the reasons we blend different clays together to make pots and stove liners is to get good plasticity. This enables the clay to be formed without cracking, and also dry without cracking. (The clay grips and holds onto itself.)

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 move 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.



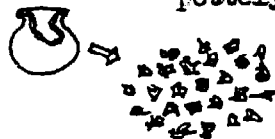
traditional shapes showing thick edges

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 outside 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 look at in respect to firing pottery stove liners.

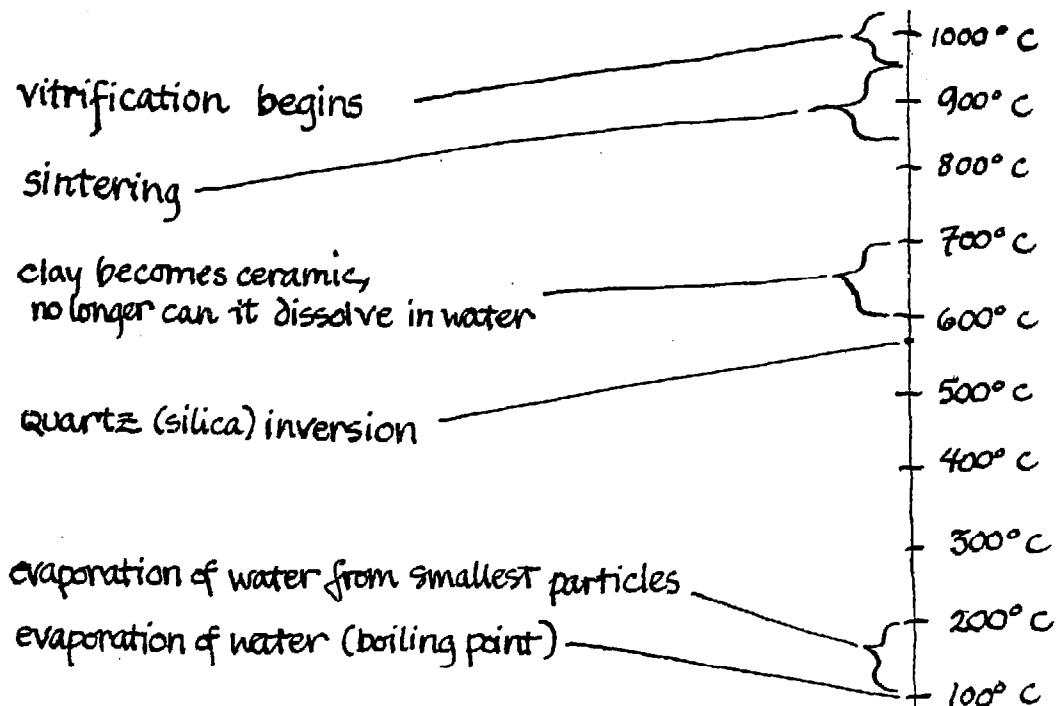
At 100° C, water is boiled out of the clay. Between 100° and 200° C, water finally escapes from between the tiniest clay particles. When water turns to steam, it expands greatly. Therefore the early stages of firing must be very slow so that the steam does not form inside the clay walls. Steam can cause 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 reaching 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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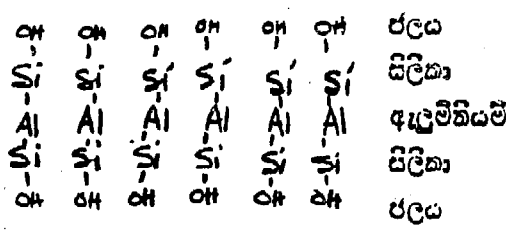
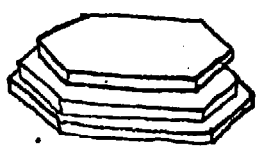
අද අපිට මැටි පිලිඹිඳු සමඟේ දැනුම වර්ධනය කිරීමට අවශ්‍ය වේ. මැටි යනු කුමක්ද? වස්ම වය පොලවෙන් ගැනීමටත් ලිපක් සෑදා අවසන් කිරීමත් අතර, වෙනස කුමක්ද දැනගත යුතුය.

මැටි යනු කුමක්ද?

මැටි බහිෂ්ඨ ද්‍රව්‍යවල නිමෙන වස්තූන් පරිභෝග කුඩා අංශු වශයෙන් සකස්කළ හැක. මැටි ලැබෙන්නේ පඵත වලට කාලගුණය බලපෑමකි. පඵත හිරු වලිට, උණුසුන්වයට, සිතලිව, වැස්සට අස්ථිභව වලටත් නිසා වහි ක්‍රියාකාරීත්වය කරනකොටගෙන ඉතා කුඩා කැලී වලට කැඩී යයි. මෙය ඉතා හෙවිහිට සිදුවන්නකි. වස්ම සමහර පඵත වෙතත් පඵත වලට වඩා මෙසේ සු සිදුවීමට කාලයක් ගතවේ. සමහර පඵත ඉතා පහසුවෙන් මෙසේ කැඩේ. ඉන් පසුව ඒවා වැඩිව නිසා නිමිත වලට ගලායයි. ඒවායේ හොඳ කොටස් අතට ගලායයි. ඒවා ගොඩනැග ගලන කාලයට ගෙනේ දෙපස මිදෙන්නට පටන් ගනී. මෙසේ කප්පාදක් මිදෙන විට එම තට්ටු මැටි බවට පත්වේ. සමහර මැටි වර්ග වෙතත් වෙතත් ක්‍රම වලට හැඩගැසේ. පඵත වෙතත් ක්‍රම වලට දියායයි. ඒවා සාමාන්‍යයෙන් සුදුසාටය.

මැටි සාමාන්‍යයෙන් මිටිකෝණ 10 ට හෝ ඊටත් වඩා කුඩා ප්‍රමාණයේ අංශු වලට ගතකැනිය. මෙහි අදහස වනුයේවය පැත්තෙන් පැත්තට සියවාරයක් වියාල මැටි අංශු මිලි මීටර් 1 ක් පමණ මැනිය හැකිය. ඊලඟට වියාල අංශුව තම මිදෙන මැටිය. 40 වාරයක් වියාල මෙම අංශුවක් හරහට මිලි මීටරයක්වේ. ඊලඟ පමණ තම වැටිය. ඉතා හොඳ වැටිකැටයක් මිලි මීටරයකින් 1/3 කි.

ඇයි මැටි එකට ඇලෙන ගතිකත්වය යුක්ත වන්නේ? :-



මැටි අංශුවල හැඩය

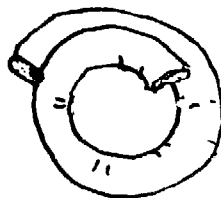
මැටිවල රසායනික සංයුතිය

මැටිවල රසායනික ව්‍යුහය සාමාන්‍යයෙන් මැටි අංශුවක ජලය ඇත. එහි අදහස ඒවා රසායනික වශයෙන් ජලයෙන් බැඳී ඇත. මැටි අවිවේන් වැස් ඇතත් ඒවාද ජලය ඇත. ඒ නිසා ජලය අතින් කොටස් වලට එකතු වේ. එනිසා මෙම අංශු තෙත මැටි එකට ඇලෙන ගතිකයන් හා ලිස්සන ගතිකයන් යුක්ත වේ. මෙහිසා මැටි එකට හැඩගන්වන විට හෝ තඳ කරන විට ඇලේ.

ඉතා කුඩා මැටි අංශුවල

පුද්‍රව්‍ය බොහෝ ඇත. ඒවායේ වියාල කැලී වලට වඩා ජලය උරාගන්නා සිදුවූ ඇත. ඉතා හොඳට ඇලෙන මැටිවල ඉතා කුඩා මැටි අංශු ඇත.

ඇදෙන සුළු ගතිය යනු මැටිවල ඇලෙන ගතිය හා එය තොකැඩී තරායැනීමට හැකිවීම. මැටි පහසුවෙන් හැඩ ගන්වා ගැනීමට තම අපි එය හොඳට ඇදෙන ගතිකයන් යුතු මැටි බව නිගමනය කළු ලැබේ. එය සමඟේ ඇතිවී වටා සහන විට කැපේතමි එය හොඳට ඇලෙන ගතියක් ඇත. ඇලෙන සුළු මැටිවල ඇදෙන ගතියක් ඇත්තේ එය හොඳ මිශ්‍රකයක් හා ඉතා කුඩා අංශු නිමෙන නිසාය. ඇදෙන සුළු මැටිවල ඉතා කුඩා මැටි අංශු ඇත. නමුත් ඉතා හොඳ මැටිවල බොහෝ පුරට ඇලෙන ගතිකයන් හා වැඩට පහසුය.



අපි වෙනස් වෙනස් මැටිගෙත වැඩ කරන වලං සාදන ලීර් සඳහා එක හේතුවක් නම් මැටිවල ඇදෙන සුළු ගබඩායි. එය පිටිරීමක් නැතිව හැඩගන්වා ගැනීමට පහසුය. ඒවා වේලෙන විටද කොපිපිටේ. මැටි එකට ගොදුරු තද වේ.

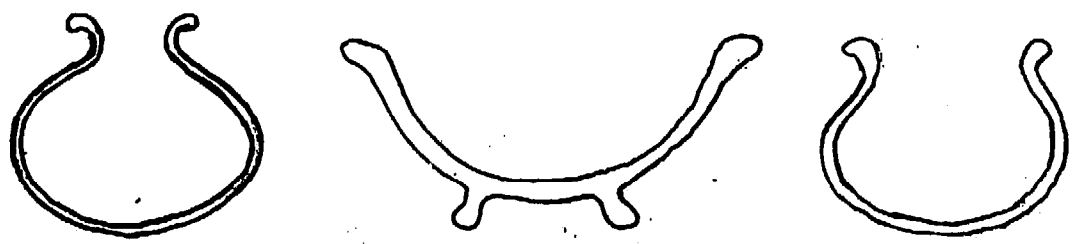
ඇදෙන සුළු ගබඩා මැටිවල කල්පැවැත්මටද බලපායි. ලෝකයේ බොහෝ රටවල වලං සාදන්නන් මැටි වැඩ කිරීමට ප්‍රථමයක් කිපයකට හෝ මාස කිපයකට පෙර මැටි අතරබිබි. ඊතයේ වලං කාර්මිකයින් පෝෂිලේන් නමැති මැටි වලින් වැඩ කළේය. ඒවා ඇලෙන සුළු ගබඩා නැත. එම නිසා යුරෝපීයයන්ගේ දැරූ ප්‍රසාදයන් විසින් පාහේ මැටි පුදාකර්මයට නැගී.

වියලෙන විට මැටි වලට සිදුවන්නේ කුමක්ද?

මැටි කැබලි හැඩගැන්වීමෙන් පසුව එය වේලීමට ඉඩ හරිනු ලැබේ. ඒවා වේලෙන විට අඹුපල නිමෙන බොහෝ පලය වාතයට හුමාල වේ. මෙය සිදුවන්නේ ඔදි වේලෙන ආකාරයටය. මෙය පාතය යනුයේ අවස්ථාවල හා අවිච්චි සැර අවස්ථාවල ඉක්මනින් සිදුවේ. කෙසේ හෝ මැටි කැබලි ඒවායේ පැත්තෙන් පැත්තට වියලීමට අවශ්‍ය ඉහල සිට පහලටත් පිටත සහ ඇතුළත පලය හුමාලය එක නිසා වියලෙන විට හැකිලීමක් විය යුතුය. මැටි අඹු පුසා ක්‍රීටිවුව නිමෙන නිසා මෙය සිදුවේ.

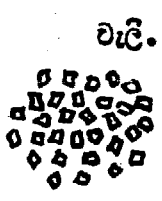
වලඳේ හෝ ලිඹේ

එක කොටසක් අනෙක් කොටසට වඩා ඉක්මනට වියලෙන විට එහි අත් කොටස් පිටිරීමට පටන් ගනී. ගතකළ නැති කොටස් හා ගත කොටස් වලට වඩා ඉක්මනින් වියලේ. එම නිසා සෑම කොටසක්ම එකම ගතකළකින් හිමිව වැදගත්ය. ඒවායේ අධික තරමක් ගතකළව විවිධ යුත්තේ එය ඉක්මනින් වියලෙන නිසාය.



පාරම්පරික හෘත්වවල ගුණකම අධිකයින් පෙන්නුම් කරයි.

පාරම්පරික වලක් සාදන්නන් ඒවා වියලීමට පහසු වීමට සාමාන්‍යයෙන් වෙනත් ද්‍රව්‍යයන් එම මැටි වලට එක් කරයි. සාමාන්‍යයෙන් විශාල වැලි තැටි මයිකා හෝ වියළුණු මැටි (පිලිස්සුණු කැබලි අසිරා) විසි කල විට ඒවා හැකිලෙන්නේ නැත. ඒවා අඹු අතර පලය රඳා පවතින පලය පිට විමට උදව් වේ. එසේම හුමාලය වී ඉවත් වීමටද උපකාරී වේ. මෙම ඉතා කුඩා සිදුරු පොරෝපිටි ඔහුවෙන් හැදින්වේ. ස්පන්දි එකක් මෙයට හොඳ නිදසුනකි. ඉතිරි හොඳ ඇලෙන සුළු මැටි වුවද ඒවා හොදට ප්‍රවේසම් සහිතව වේලුවේ නැත්නම් පිටිරීමට ඉඩ ඇත.



වැලි. (sand)
පිලිස්සු මැටි කුඩු කර සාදා ගත් මැටි.

මයිකා. මාදුකැටි තුනි පතුරු, තුනි කැබලි.



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

මැටි පිලිස්සීමට පසුව සිදු වන්නේ කුමක්ද?

මැටි පිලිස්සීම තරඟ වීම එය පිලිස්සුණු මැටි බවට පත් වේ. හරියාකාර පිලිස්සීමෙන් පසුව ඒවා නැවත මැටි බවට පත් කිරීමට බැරිය. මෙම මැටි පිලිස්සීමේදී ඉතාමත් අවධානය යොමු කළ යුතු පියවරවල් කිපයක් ඇත.

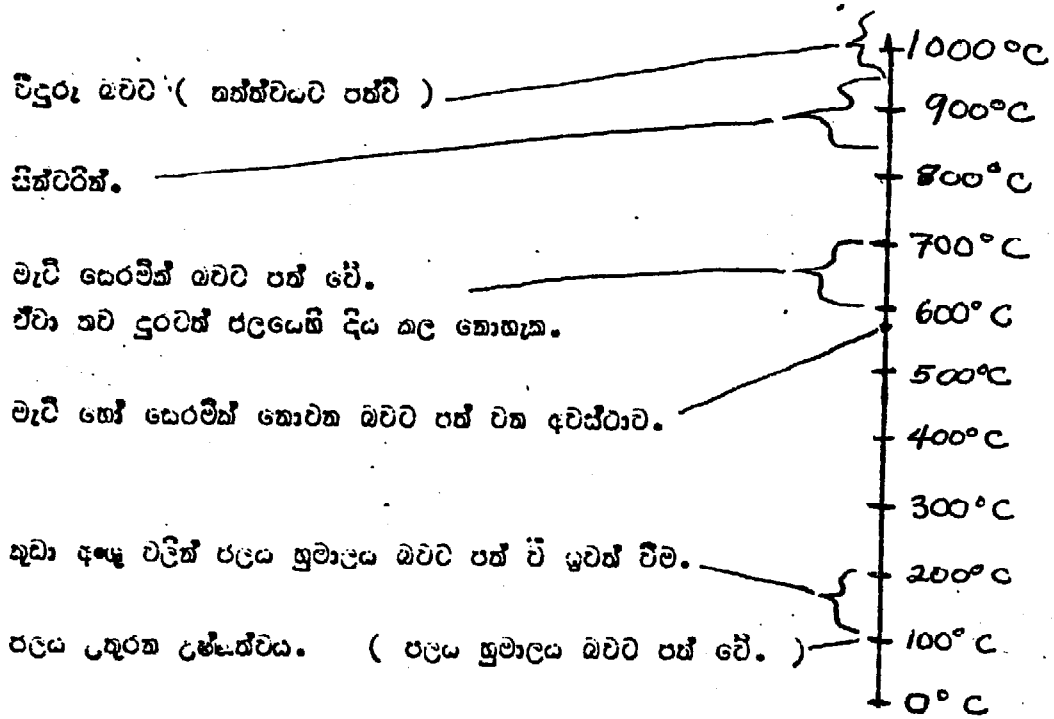
සෙ. ශ්‍රේණි 100' මැටි වල ජලය උතුරයි. සෙ. ශ්‍රේ. 100'-200' ජලය ඉතා කුඩා අංශු වලින් ඉවත් වේ. ජලය සුමාලය බවට පත් වන විට එය වියාල වේ. එම නිසා පුද්ගලික පලමු පියවර වලදී ඉතා සියුම්ව කළ යුතු වන්නේ එහි ඇතුළට නැවත ජලය නොයන පරිදි පිලිස්සීමය. මෙම සුමාලය කුඩා පිපිටිම් වලට හේතු වීමට ඉඩ ඇත.

සෙ. ශ්‍රේ. 573' ද එය මැටි හෝ සෙරමික් නොවන තත්ත්වයට පත් වේ. සිලිකා වල ඇති කිඳුකස් ක්‍රියාව නිසා මෙය පලල් වීමට ඉඩ තිබේ. සෙ. ශ්‍රේ. 573' පහල මෙම සිලිකා කිරීවැටෙන තත්ත්වයට පත් වේ. සෙ. ශ්‍රේ. 573' ද ඒවා හදිසියේම 1% නිත් වියාල වේ. එය සෙ. ශ්‍රේ. 573' පහලට සිතල වන තෙක් පවතී. මෙහිදී හදිසියෙන් හිරි වැටුණු තත්ත්වයට පත් වුණු විට 1% නිත් හැඩගැස්වේ. එම ආකාරයෙන්ම තුනී කොටස් ඉක්මනට වේලේ. එම නිසා පිලිස්සීමේදී මෙහිදී ගැටළු ඇති වීමට පිලිවන. මෙම මැටි පිලිස්සුණු තත්ත්වයට පත් වන විට පෝරුන් තත්ත්වය ප්‍රමාණවත් විය යුතුය. මන්ද සිත් භාන්දයේ සෑම කොටසක්ම එකම වේලාවේදී සෙ. ශ්‍රේ. 573' ද උෂ්ණත්වයට පත් විය යුතුය. එසේ නොමැති නම් එහි තුනී කොටස් ඉක්මනට පිපිරේ.

උෂ්ණත්වය සෙ. ශ්‍රේ. 600 - 700 ක් අතර වන විට මැටි තව දුරටත් පලයෙහි දිය කල නොහැක. ඇත්තවශයෙන්ම ඒවා තව දුරටත් මැටි භෞවේ. ඒවා දැන් පිලිස්සී ඇත. එසේම හොඳ තත්ත්වයට පත්වීමට තව පියවරවල් කිපයක් ඇත. එය දැන් වියවුණු ඒවාට පඩා ශක්තියෙන් අඩුය.

සෙ. ශ්‍රේ. 850' - 950' අතර සීරීර අංශු සිත්ටර් බවට පත් වේ. මෙම කොටස් සෙරමික් ශක්තිමත් වීමට උපකාරී වේ. මෙම අංශු සීරීරව නිශේත අතර එහි මතුපිට උණුවීම සිදු වේ. යකඩ කැබලි උණු නොකොට එකට සවි කරන්නාක් මෙන් මැටි වල වෙනත් යනිප පොරොසියම් හෝ යකඩද ඒවා සිත්ටර් වීමට උපකාරී වේ. මෙයට පසුව මෙම කොටස් වෙන් කල නොහැක. තදින් එකක් බවට පත් වී ඇත.

සෙ. ශ්‍රේ. 950' දී එම සෙරමික් උණු වීමට පටන් ගනී. ඒවා විදුරු තත්ත්වයට පත් වේ. විදුරු මෙන් ඒවා ලිපි වලට නුසුදුසුය. අංශු උණු වී සිදුරු සියල්ලම වැසේ. (ඉතා හදට සෙරමික් හැඩ ලී ඒවා උණුවේ.) ලිපි කැම පිපිටිම ප්‍රයෝජනවත් භක්තා වීම උණුසුම් රඳා පවතින කොටස් ඉක්මනට පලල් වේ. සෙ. ශ්‍රේ. 900' පහල තත්ත්වයට පිලිස්සූ ලිපි වල සිදුරු පලය උරා ගැනීමට හැකි තත්ත්වයට පත් වන්නේ ඒවා අතර නිශේන්තා වූ ඉතා කුඩා අංශු අතර ඉඩ තිසයි. ඉතාමත් හදට පිලිස්සුණු සෙරමික් වල පලල් වීමක් ඇති තෙවෙන නිසා එහි පිපිටිම් ඇති වීමට ඉඩ තිබේ.



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 a door 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. The stove liner must be made to exact dimensions in order to work properly. The two parts must fit together, and the potholes must properly accommodate 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

Problem Solving

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.

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.
- . Alter the production methods to avoid this problem.

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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 cockpots 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 unevenness 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 from 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 are 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. Analyze 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 plasticity 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 a lot 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	
	assembly	100
	skill training time	
	space for work, storage, and boards	3
-firing	firewood	50
	time and skill, firing	75
	kiln building, maintainance	40
		<u>355.50</u>

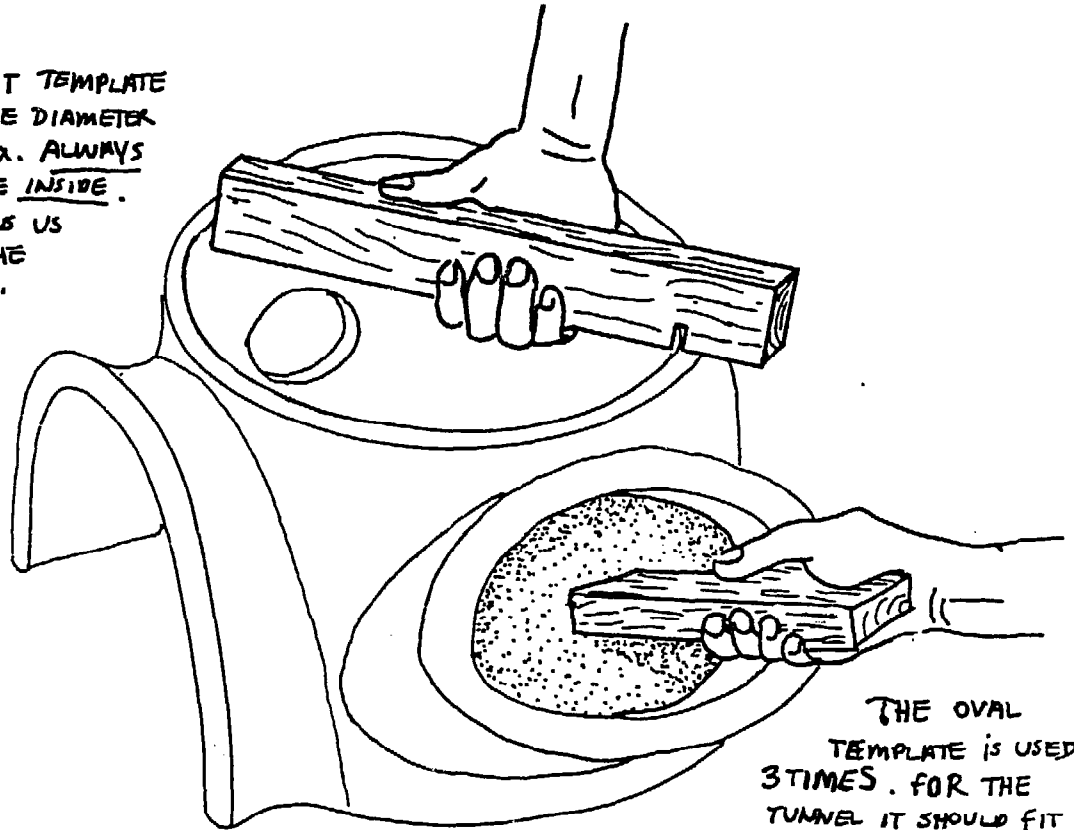
Rs. 355.50 ÷ 20 stoves = Rs. 17.7 each, or about 18.

*(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

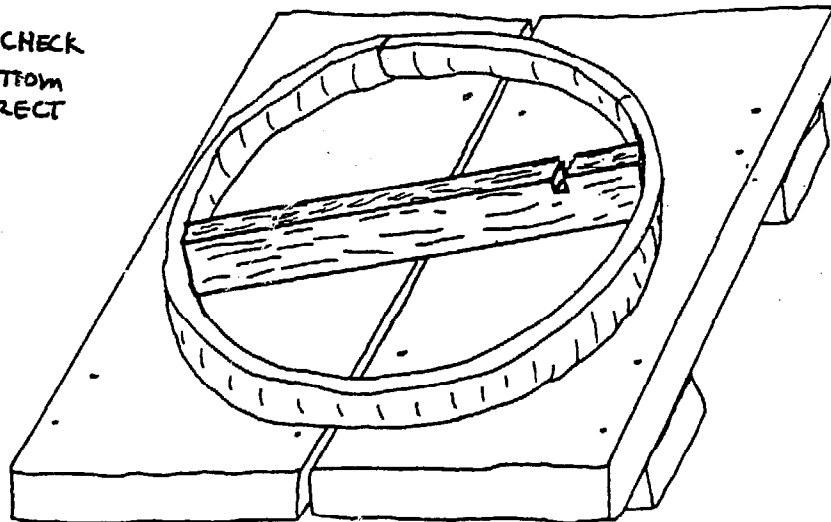
THE TEMPLATES: USE ON WET STOVES ONLY (AS THE STOVE IS BUILT)

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.

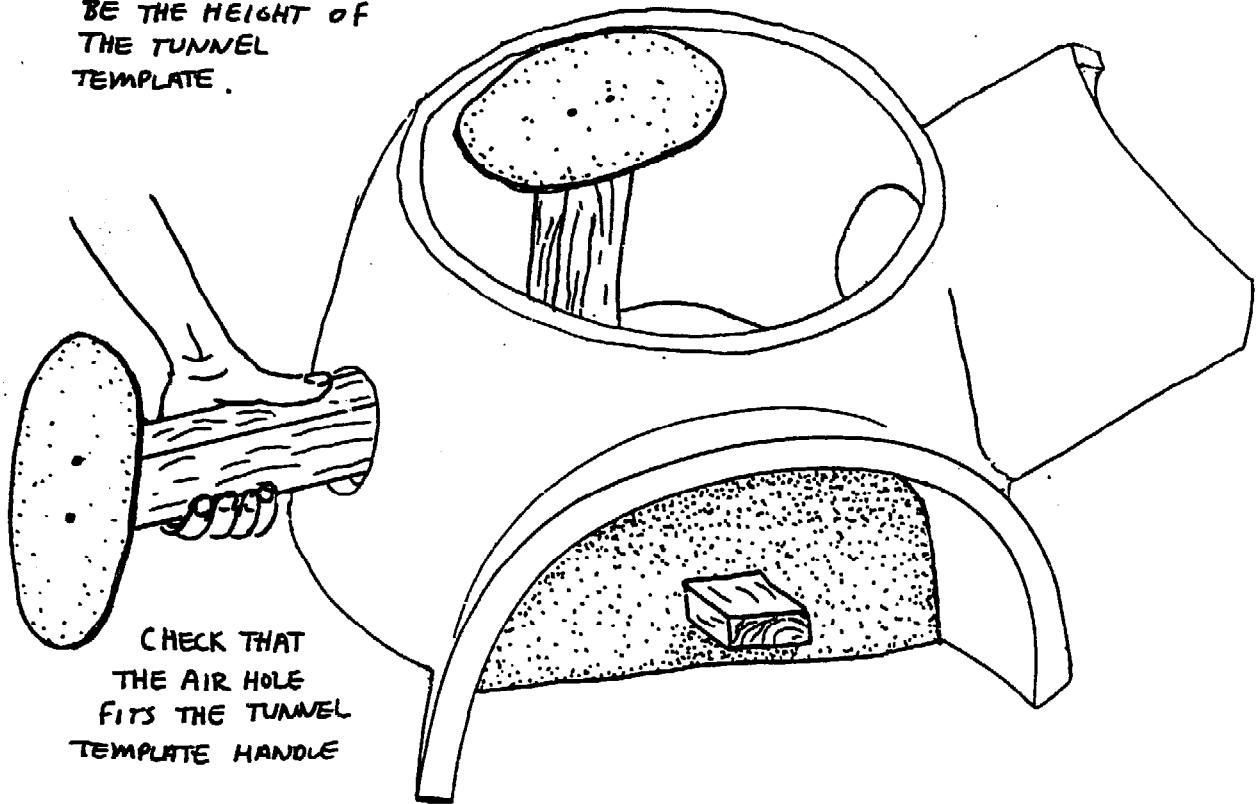


THE OVAL TEMPLATE IS USED 3 TIMES. FOR THE TUNNEL IT SHOULD FIT ALL THE WAY IN.

FIRST YOU CHECK THAT THE BOTTOM IS THE CORRECT SIZE.

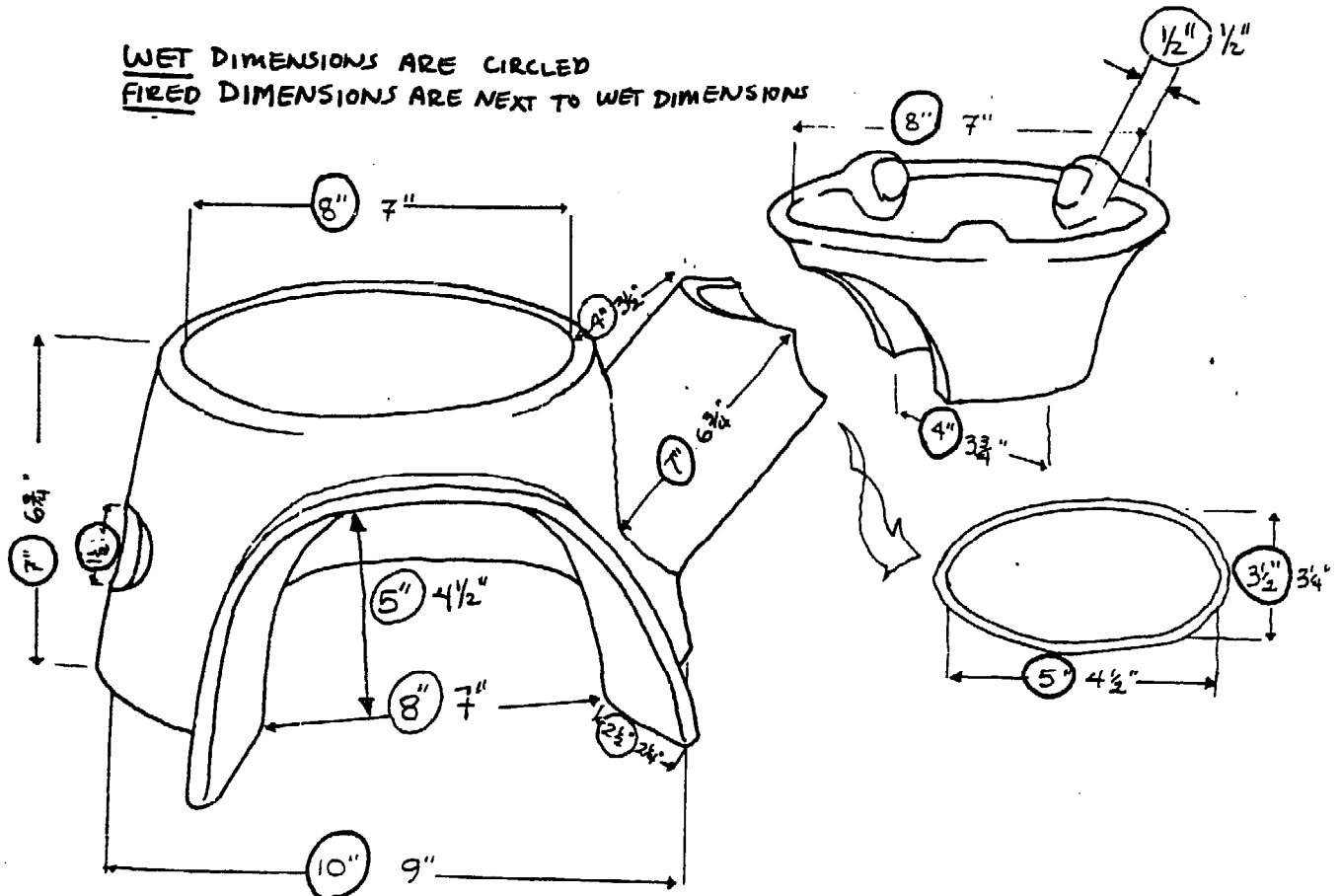


THE FIRE BOX MUST BE THE HEIGHT OF THE TUNNEL TEMPLATE.

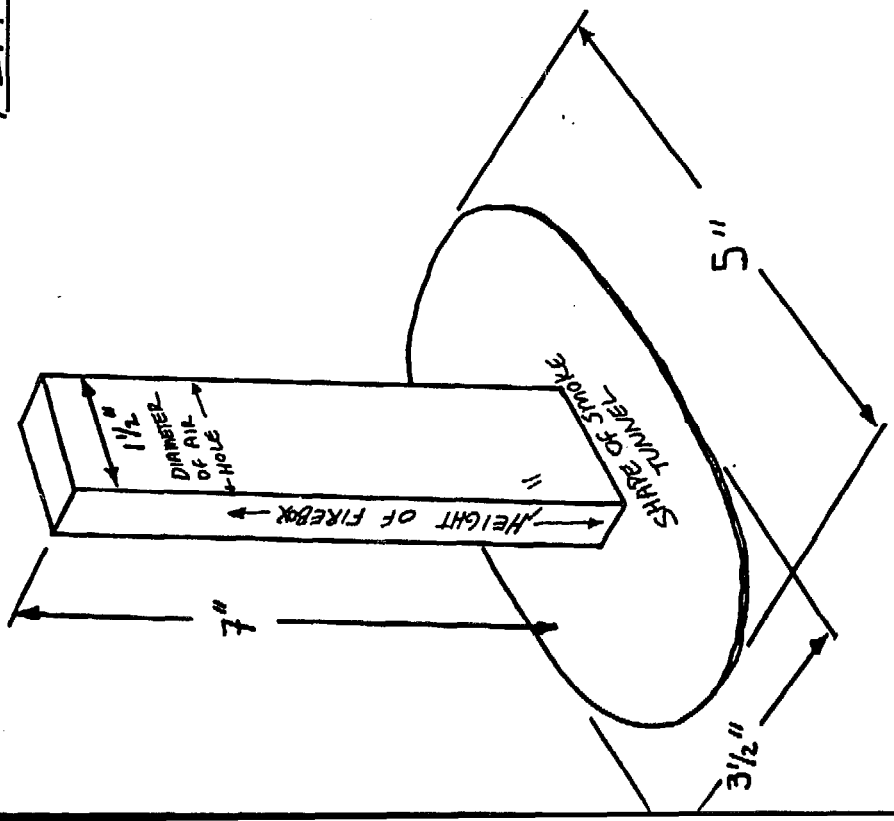
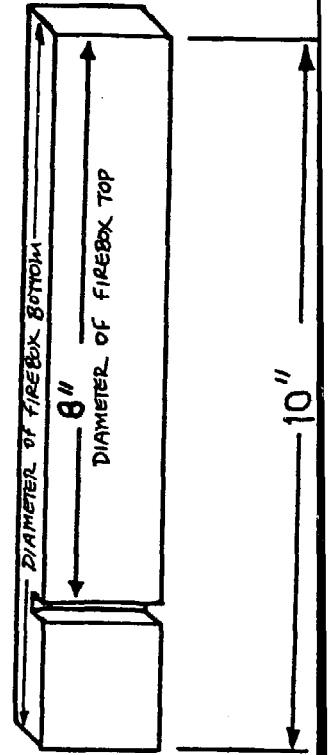
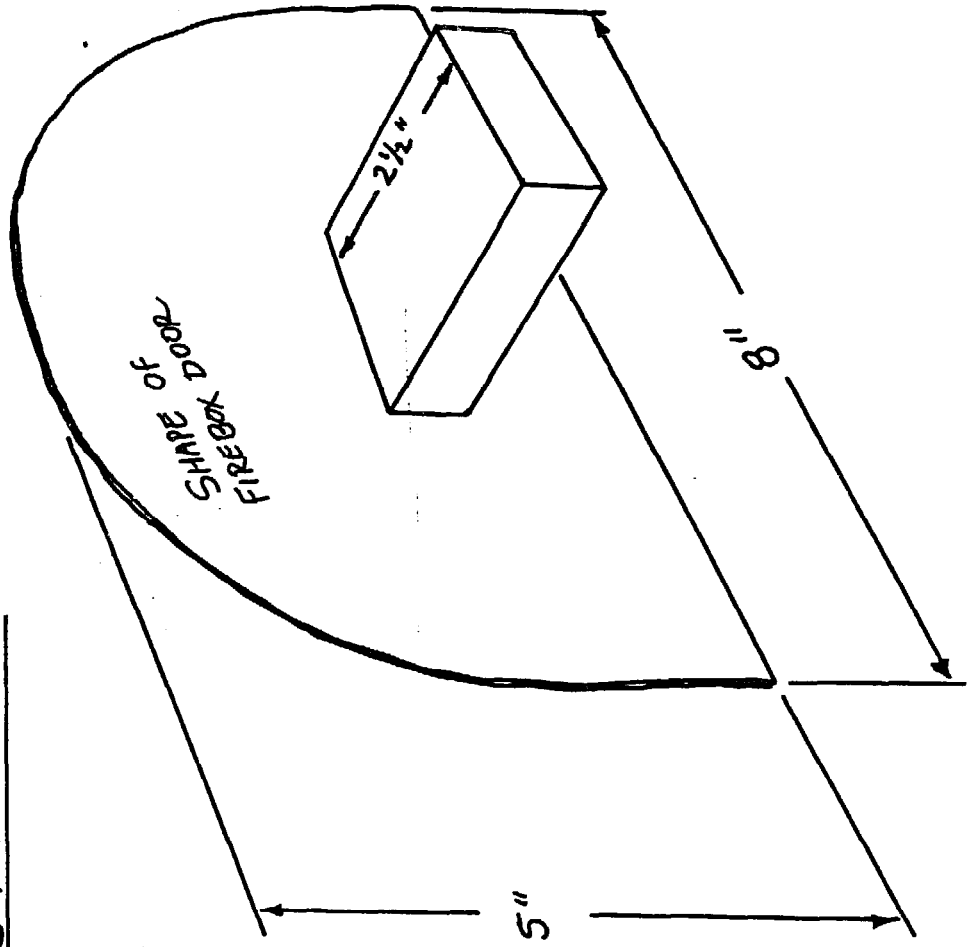


CHECK THAT THE AIR HOLE FITS THE TUNNEL TEMPLATE HANDLE

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? _____

ලිපි පරීක්ෂකයාගේ ආකෘති පත්‍රය.

ආශ්‍රේ.	මුත් විශාල හෝ ඉතා කුඩා.	ප්‍රතිඵලය.
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දෙවෙනි සිදුරේ විස්තරය.		
වලද ආදාරක වල උස.		

ලිපි සිදුරු වටකුරුද? ප්‍රතිඵලය කුමක්ද?

පලලු වැන්න.....

දෙවැන්න

මෙහෙය දෙවැන්න ලිපි සිදුරට හොඳට පව වී තිබේද? ප්‍රශ්නය කුමක්ද?.....

.....

ලිපි මුද්‍රණ මැටි මුහුණ මාදුන-තදද? ඔව්. කැහැ.

එය ඉතා මාදුන නම් කුමක් සිදු වේද?.....

.....

මෙම ලිපි පිලිබඳව කොහේ ප්‍රශ්න තව දුරටත් තිබේද?.....

.....

APPENDIX 6FOLLOW UPINTRODUCTIONWhat 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 because 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.

අනුගමනීය වැඩපිළිවෙල හඳින්වීම

අනුගමනීය වැඩපිළිවෙල යනු වෙත් අප අදහස් කරනුයේ කුමක්ද?

අනුගමනීය වැඩපිළිවෙල යනු වෙත් අදහසු කරනුයේ ප්‍රගතිය සහ සම විසින් පුහුණු කරනු ලැබුවත්ගේ ගැටළු පරිච්ඡාදන බැලීමට. පාසලකදී කරනු ලබන පරිච්ඡාදන වුවද එක්තරා චර්යාමය අනුගමනීය වැඩපිළිවෙලකි. එබැවින් ගුරුවරයා විසින් එබැවින් ප්‍රගතිය හා ගැටළු පරිච්ඡාදන කරයි.

අනුගමනීය වැඩපිළිවෙලක් අවශ්‍ය වන්නේ ඇයි? -

1. කෘත්‍යයේදී මිනිසුන්ට උදව් කිරීමට.

එම ලීප් සාදන්නන් සහ ඒවා සවිකරන්නන් පරිච්ඡාදන කිරීමේදී එබැවින් ප්‍රශ්න අවධානය යොමුවිය යුත්තේ සමුත්තර හොඳ ලීප් සාදීමට උදව් කිරීමටය. නොහොඳව මිනිසුන් සමුත්තර ප්‍රශ්න ලීප් සවි කරන්නන්ට සමුත්තර හොඳම පවත්වා ගැනීමට හෝ සමුත්තර ලීප් හොඳට ක්‍රියාකාරී වේද යන්න ගැන කොඳුකර නිසා එම ප්‍රශ්න කීමට අකමැති වේ. නිතරම එබැවින් මිනිසුන්ට සමුත්තර වැඩය කොටසේ පහසුවට හා ඉතා හොඳ තත්වයක් නිසා කිරීමට උදව් කරන්නේ කෙසේද යන්න ගැන සිතා බැලිය යුතුය.

2. පුහුණු කරන්නන්ට සහ සැලසුම් කරන්නන්ට ආපසු කොරතුරු ලබා ගැනීම:

එම හොඳ පුහුණුවක් හෝ වෙතක් ක්‍රමයකින් විසඳා බැලීමට ඇති ගැටළු ගැන කලාපොලොකුමුවීම සිදු වේ. ලීප් සවි කරන්නා විශාල ප්‍රදේශයක ලීප් සවි කිරීමේ කියැවී සිටීමද; ලීප් සවිකරන්නන් ගෘහස්ථයන්ට සමුත්තර ලීප් තවත්කුම ගැන උපදෙස්දීමට පුහුණුව ලබා තිබීමද; මෙම අනුගමනීය වැඩපිළිවෙල ක්‍රියාත්මක කිරීමේ වැඩකරන ක්‍රමය අනුව කොටසේ නිවෙස් වලට ලීප් ලබාදීමේ විශ්වාසය එබව ඇතිවෙනු ඇත.

3. සම අනුගමනීය වැඩපිළිවෙල කරනුයේ කවදාද?

එම කෘත්‍යයේ පරිච්ඡාදන යුත්තේ කුඩා ගැටළු විශාල ගැටළු වුවද පත්වීමට ප්‍රමුඛයෝය. ඒවායේ සැලකිය යුතු ගැටළු ඇත්තම් ඒ වගාම ලීප් සවි කරන්නාට දැනුම්දිය යුතුය. ඇත්ත වශයෙන්ම එය යුතුම ඇත්තේ නි නුසුදුසු තත්වයේ වැරදි ඇති ලීප් නිවැරදිව නැවත සවි කිරීම හෝ ඒ වෙනුවට වඩාත් හොඳ කායනීකරණයකින් යුක්තව ලීප් සවිකර දීමය.

මූලික ගැටළු විසඳීමෙන් පසු සම විසින් ලීප් සවි කරන්නා මාස 3 කට හෝ මාස 6 කට පසුව ඒවායේ තත්වය තවදුරටත් උසස්ව නිවැරදිව හෝ නුසුදුසු තත්වයේ තිබීමද යන්න ස්ථිරවම දැන - ගැනීම විශිෂ්ට පරිච්ඡාදන යුතුය.

APPENDIX 7STOVE 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? _____

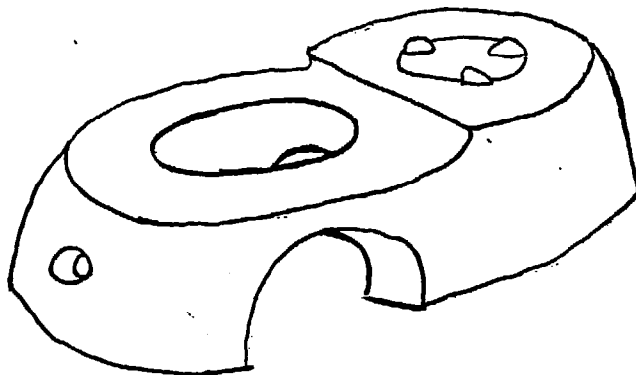
5. Is the second pot hole correctly positioned? _____

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)

ලිපි සැකසීමේ ඇගයීම් පිලිබඳ පවිසාම.

දිනක..... පරීක්ෂකවරයාගේ නම.....ලිපි සැකසූ අයගේ නම.....
.....ලිපි සකස් කල දිනක.....ශාඛයේ පදිංචි සංඛ්‍යාව.....
.....ගමේ නම..... ගෘහ මූ ලිපියාගේ නම.....
.....වේලාව..පෙ.ව. ප.ව.....ලිපි වර්ගය.....

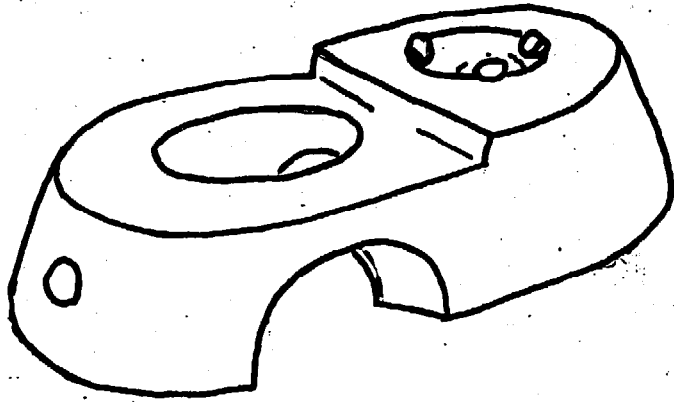
ලිපි සාදා ඇති ස්ථානය.(බිම, මුල්ලක, උස් ස්ථානය.(පෝරනුවක).....
ග ශාඛනිකගෙන් ඇසිය යුතු ප්‍රශ්න.

1. මෙම ලිපි සමච ප්‍රයෝජනවත්ද? ඔව්. නැත. කෙසේද.....
2. ලිපි පාවිච්චියේදී ඇති බාධක මොනවාද?
 ගිණි දැල්වීමේදී. ඔව්..... නැත.....
 දර වැඩිපුර වැඩ වේද? ඔව්..... නැත.....
 සෑම ප්‍රමාණයකම භාජන පාවිච්චි කරනවාද? ඔව්..... නැත.....
 පාරම්පරික ලිපිව වඩා වැඩි වේලාවක් ගත වේද? ඔව්..... නැත.....
3. ලිපි පාවිච්චි කරන ආකාරය.-සියළුම කෑම පිසීම කඳහා.....
 -සියළුම කෑම වර්ග පිසීමට (හේ හැර).....
 -ආහාර වර්ග කීපයක් පිසීම සඳහා.....
 -පාවිච්චි තොකරණ.....
4. ලිපි සකස් කිරීමට මිශ්‍රණයට අවශ්‍ය ද්‍රව්‍ය සමච එකතු කලාද? ඔව්..... නැත.....
 ලිපි සකස් කරන්නා අවශ්‍ය දෑ රැස්කිරීමට ඉල්ලීමක් කෙලේද? ඔව්..... නැත.....
5. ලිපි සකස් කිරීම සඳහා සම්පුර්ණ වියදම.....
6. ලිපි සවි කිරීම සිදු වූ අයුරු. සාර්ථක ලෙසද? අසාර්ථක ලෙසද? එසේ නම් හේතු.....
7. ලිපි අගන් වැඩියා කිරීම සඳහා දිගු කල් පැවැත්ම සඳහා ලැබූ උපදෙස් කවරේද?.....
8. ශ්‍රී ලෙඹි ගොම මැටි ගෑම කරනුයේ නවර අන්දමකින්ද? උදා. දෙසතිකව වරක්.....
 මාසිකව.....
9. දර ලබා ගන්නා ආකාරය.-මිලදී ගැනීම. ඔව්..... නැත.....
 -සතිකව දළ සඳහා වැඩ කරන මුදල.....
 -එකතු කර ගනිද?....ඔව්..... නැත.....
 -සතිකව කී වතාවක්ද.....
10. ලිපි පිලිබදව ශාඛනිකගේ අදහස් සහ යෝජනා.....

ලිපි පරීක්ෂා කිරීම.

1. ලිපි ස්වභාවය. උනුසුම්ව ඇත..... නැත.....
2. ලිපිගේ අච පිරි ඇත..... නැත.....
3. බිංගෙය පිරිසිදුව ඇත..... නැත.....
4. ලිපිගේ පවතින ස්වභාවය කෙසේද?
 ලිපි පිරිසිදුව තබා ගන්නේද? ඔව්..... නැත.....
5. ලිපි සාදා ඇති ස්ථානය සුදුසුද? නුසුදුසුද?.....

- 6. දෙවන භාජනය පාවිච්චි කිරීමට ලිපි සිදුර නිවරදිව සකසා තිබේද?.....
- 7. එා කවුළුව නිවරදිව සකසා තිබේද?.....
- 8. ලිපෙහි නිමාව.(හැඩ හැන්වීම,සහ මැදිම සඳහා ගත් විලාසය හොඳද?.....
- 9. විලාසයේ හැඩලිපි පවතීද? ජවී..... තැන..... විස්තර දක්වන්න.....
- 10.ලිපෙහි පිටිවීම් සහ ප්‍රශ්න ඇති ස්ථාන රූප සටහනේ ලකුණු කරන්න..



11. මේ පිලි මඳව පිටුගස් වෙතත් අදහස් සහ යෝජනා පසු පිටවෙහි 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 two 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?

සර්වෝදය ශ්‍රී ලංකා විදුලිබල මණ්ඩලය (මලකෝඩ්) හා එකාමදා
ඉක්මන පිටිමැස්මේ දං උසුන් පිලිබඳ පාඨමාලාව (දෙසව්),
1985 අගෝස්තු අවසන් පරීක්ෂණය

කම:- ලිපිකය:-

පහත සඳහන් ප්‍රශ්න පලට පිටිතොරු සපයන්න. (කාලය පැය 1 කි)

01. අප දියුණු කල එඩාන් කායවිකෘති දං ලිපි පිලිබඳව වැඩ කරන්නේ ඇයි?

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02. පහත සඳහන් ලිපි වගී පාවිච්චි කිරීමෙන් ඇති වැඩි මොනවාද?

පාවිච්චි ලිපි	කායවිකෘති දං ලිපි
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03. ශ්‍රී ලංකාවේ වන සම්පත විනාශ කිරීමේ හේතුවෙන් අපට මුද්‍රාපාලන සිදුවී ඇති ප්‍රශ්න 3 ක් සඳහන් කරන්න.

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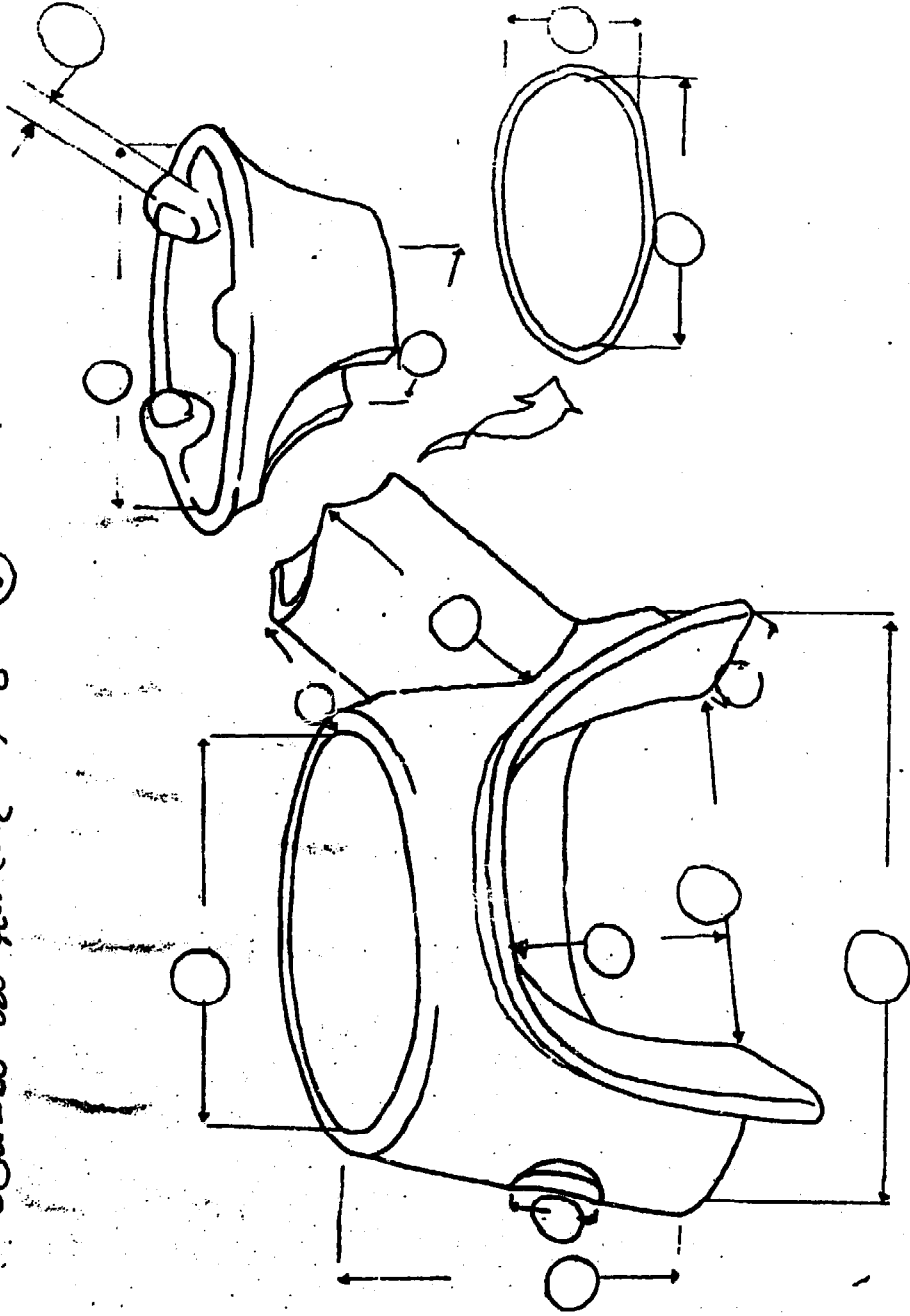
04. වලං මැටි ලිපි (වලං කාමරිකයා සමග) සකස් කිරීමේදී භාවිතා කල යුතු නිවැරදි මිනුම් සඳහන් කරන්න. (පිලිතොරු ලිපිම සඳහා පසුපිටේ අලුණ ඇති රූපසටහනද උපයෝගී කරගන්න)

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

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വ്യാജപത്രങ്ങൾ കണ്ടിട്ട് ഉപയോഗിക്കാൻ പറ്റാത്ത പക്ഷം പത്രങ്ങൾ ഉപയോഗിക്കാൻ പറ്റാത്ത.

പ്രസിദ്ധീകരിക്കാൻ പറ്റാത്ത (പ്രസിദ്ധീകരിക്കാൻ പറ്റാത്ത) പത്രങ്ങൾ.



06. පබේ අදහස් අනුව දෙවන භාජනය පාවිච්චි කරනු ලබන ලීප් පිටුරේ ඇති පාඩු පොදු වැරද්ද තුළින්ද?

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07. පාවිච්චියට ගත නොහැකි වලං මැටි ලීප් සඳහා වලං කාර්මිකයා මුදල් ඉල්ලන විට පිටිතොට වැනි පාඩු කුමක් කිවහැක්කේද?

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

- I.
- II.
- III.
- IV.

09. ලීපක් මැටි ගැසීමට පලපුරුස්ස ගත යුතුයාගෙන් පහ ඇති පුදුම ප්‍රධාන කරුණු වෙනස්වන්න.

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10. ලීපක් මැටි ගැසීමේදී හේතු විෂයක සඳහා ප්‍රමාණයන් පමණි මැටි ප්‍රමාණයන් පාවිච්චි නොකිරීමේදී තුළින් වන්නේද?

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11. දෙවන ලීප් පිටුර ප්‍රමාණයන් ලබාගත් සහ තර්කානුකූල සහස්තර කිරීමේදී දෙවන පුදුමයේ දුම පිටවන්නේ ඇයි?

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12. තිස්සානාට හැසවක් නැති පිටුර සහිත ලීපක් පාවිච්චි කිරීමේදී ඇතිවන ප්‍රශ්න වෙනස්වන්න.

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13. ලීප පාවිච්චියේදී දුම සහිත කෙමින් හිතේද ඇදීමේදී හේතු 2 ක් දක්වන්න.

- I.
- II.

14.

14. උප් ක්ෂේත්‍රයේ සම්බන්ධතාවය විවිධ වැඩ පටුනුවල සහ සේවා මැදිසා යුග්මයේ ප්‍රවෘත්තියන්
කාර්යමය කාර්යයන් පිළිබඳව:

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15. උප් පාරිභෝගික සම්බන්ධතාවය පිළිබඳව පවතින සමස්ත තොරතුරු පාරිභෝගික සමස්ත සඳහාත් හා සමඟ
විවිධ සහ විවිධ පරිච්ඡේදයන් යුග්මයේ කුලක්ද:

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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.

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

මුත්ත විවිද්ධවේ දර යුත් විදිමද පාඨමාලාව - 1985 අගෝස්තු සම්මේදය ඩී.ලං.වි.ම. (මලකත්ති විකනය) හා විකාමද්වව

පාඨමාලා ඇගයීම:-

මෙම ඇගයීම් පත්‍රිකාවෙන් අප ඔලොගොරොන්තු වන්නේ අපගේ ඉදිරි වැඩසටහන් ප්‍රමවත් කරගැනීම ඔැවිත් පාඨමාලා ලාභීන්ගේ අවක අදහස් සහ යෝජනා ඉතාමත් අගේකොට සලකමු. සමගේ විදිතුරු හැඬවිත්ම අප ලබා ගනුයේ ඉදිරි වැඩසටහනු සාර්ථක කරගැනීම සඳහා පමණි. එබැවින් සමගේ නම සඳහන් කිරීම අවශ්‍ය නැත. පාඨමාලාව සහ සහතික පත්‍ර බෙදාදීම විදිමදව මෙහි කිසිදු සම්බන්ධයක් නැත.

කාලය විකාසි 30 යි (ඉදිරියේ ඇති කොටුවේ නමාගේ නැමැදීම)

- 01. පාඨමාලා කාලය
 - ඉතාමත් වැඩිය. අනුව / ලැබූ යොදන්න
 - ප්‍රමාණවත්ය.
 - ඉතාමත් කෙටිය.
- 02. පාඨමාලාවේ වැඩිමුදු ප්‍රමාණය
 - ඉතාමත් වැඩිය.
 - ප්‍රමාණවත්ය.
 - ප්‍රමාණවත් නොවේ.
- 03. දේශන හා සංසන්දනය කිරීමේදී ප්‍රායෝගික වැඩසටහන්කල ප්‍රමාණය
 - දේශන වැඩිය.
 - ප්‍රමාණවත්.
 - ප්‍රායෝගික ප්‍රමාණ වැඩිය.
- 04. සාකච්ඡා කල කාලය
 - ඉතාමත් වැඩිය.
 - ප්‍රමාණවත්.
 - ප්‍රමාණවත් නොවේ.
- 05. පාඨමාලාවේ න්‍යායීය දැනුම
 - ඉතාමත් වැඩිය.
 - ප්‍රමාණවත්.
 - ප්‍රමාණවත් නොවේ.
- 06. පාඨමාලාවේ විෂයයන් 4 න් කිසිකි. ඉන් මඔව් ප්‍රශ්න ඇති විෂයයන් සරි ය ලැබුණිත් පෙන්වන්න.
 - වලං කාර්මිකයින් සමග වැඩ කිරීම.
 - ලිපි සැකසීම. (වැට් හැසිරීම)
 - ලිපිවල වැයදී ලැබූ කිරීම.
 - අනුමතකය වැඩිවීමට.
- 07. පාඨමාලාව විෂයට අදාළ නොවන අනවශ්‍ය කොටස් කිසිකිද? එසේනම් ඒ මොනවාද?
- 08. පාඨමාලාවේ වැඩිපුර කාලයක් ගෙන සාකච්ඡා කලයුතු සහ අදහස් දැක්විය යුතු කොටස් කිසිකිද? එසේනම් ඒ මොනවාද?
- 09. විෂය මාලාව සාර්ථක කරගැනීමට සමේ අවස් 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)