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MALNUTRITION / INFECTION CONTROL PROJECT

**PART I
APPENDICES**

**INSTRUCTION MANUAL FOR TEACHER / SUPERVISORS
TO VILLAGE HEALTH AGENTS**

Prepared by :

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Food for Peace Officer
Kabul, Afghanistan
June 1, 1975**

INSTRUCTION MANUAL FOR TEACHER/SUPERVISORS
TO VILLAGE HEALTH AGENTS

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LIST OF CHARTS (AND FIGURES) FOR CLASSROOM DISCUSSION

Section	Page	Description	Figure #	Chart #
		<u>Chapter IV Personal Hygiene</u>		
	40	10 Rules for Personal Hygiene & Sanitation		
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I	49	VHA's Cross Reference House # to Name	17	
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II	57	Posting Kilos & Half Kilos to A/W Record Card	19	20
II	58	Writing Months & Years on A/W Record Card	20	
II	59	Reading the Model Weighing Machine	21	21
II	60	Infant Weighing Sling	22	
II	61	VHA's Monthly Workload Control (Complete)		22
III	63	Village Statistical Progress Report (Complete)		23
III	64	VHA's Cross Reference-Name to House #	23	
III	64	VSPR Summary (Incomplete)		24
III	65	VSPR Summary (Complete)	24	25

RECOMMENDED FILMS AND FILM STRIPS

Appendix II

3/24/75

Catalogue No. *	Title	Language	Minutes
<u>Films</u>			
85	Isolation of the Sick in the House	Persian	20
86	Suffocation	Persian	20
88	Tuberculosis Is Curable	Persian	25
89	The Village Sanitary Center	Persian	30
90	Said Learns How to Dress A Wound	Persian	15
93	Dysentery	Persian	30
95	Care of Eyes	Persian	15
96	Fight Against Lice	Persian	14
97	The First Months of Pregnancy	Persian	22
98	The Last Months of Pregnancy	Persian	30
99	Nursing After the Baby Is Born	Persian	35
100	Bathing the Baby	Persian	25
125	Immunization	English	11
130	Learning About Your Nose	English	9
173	Fundamentals of Diet	English	11
218	The Mechanism of Breathing	English	11
644	Water Friend or Enemy	English	10
645	You and Your Food	English	10
671	How Disease Travels	English	10
686	Care of Newborn Baby-Nurse's Role in Instructing the Parents	B. W. English	25
755	How our Bodies Fight Disease	B. W. English	10
757	The Teeth	B. W. English	10
<u>Film Strips</u>			
112	Village Problem-Poor Family Living	English	
132	The Village Well	English	
173	Village Problems: 1. Lack of Education for Boys and Girls 2. Lack of Adult Education	English	
195	How to Prevent Cholera	English	
197	Balanced Diet for Adults in India	English	
198	Better Diet of Low Cost	English	
201	Your Sanitary Inspector	English	
223	Men Against Disease	English	
224	Food and Health	English	
258	Village Problem-Poor Health	English	
330	Fundamental Life Science, The Intestinal Round Worm of Man	English	
331	The Hook Worm (Part I)	English	
349	Community Sanitation	English	
* Ministry of Education, Audio Visual Department			

PURCHASE ORDER - MRS. MARY MACMAKIN

I. WORK TO BE PERFORMED:

Write and deliver a typewritten report in English on the subject of:

Section VI - The Economics of Family Feeding

Section VII - Utilization of Fifty (50) Afghan Foods

which report shall comprise sections VI and VII of a nutrition text.

II. EXPLANATION:

Chapters VI and VII already have been outlined; this outline may be modified as the contractor and USAID/FFP may agree. The report will comprise one part of a manual to be used by 12th grade educated Afghan women in their instruction to semi literate or totally illiterate Afghan village women. The report may refer only to those facilities and commodities which are available in the typical Afghan villages. The report should be brief, succinct and use simple words and procedures which can be understood by illiterate village women.

III. PROCEDURE:

1. Examine the List of 50 Afghan Foods (Attachment A) to see if additional foods may be added to the list which are suitable for infants (e.g. anise, cumin, bitterorange, sweet pepper) also add salt, fat, clover, wheat germ.

2. Prepare a written procedure on how to process each food on the (now revised) list of 50 Afghan Foods.

(a) By "process" we mean

(1) How to Procure - (the economics of family feeding).

(2) How to Clean

(a) cauliflower, cabbage, beet-carrot-onion tops, mustard seed tops, spinach,

(b) horseradish, beets, carrots, potatoes, orange

- 2 -

- (c) chicken, liver, hearts
- (d) mungbeans, broadbeans, chickpeas, cowpeas
- (e) wheatbran, rice bran, cornmeal
- (f) nuts, sesame, crude, raisins, figs
- (g) oils, butter, gur, sugar, honey

(3) How to Shape

- (a) chop
- (b) chop except squeeze oranges
- (c) chop
- (d) soak, dehull, crush, cook
- (e) chop very fine, cook
- (f) ? How to Prepare
- (g) No cleaning possible

(4) How to Cook

- (a)
- (b)
- etc.
- (g) No cooking required

(5) How to Store - germs, safe storage, safe cooking, reheating foods

(6) How to Serve-wash hands, wash spoon and glass, spoon vs bottle

- (b) Write the six processing procedures by groups of foods so that the village women can better remember the instruction (as illustrated per Attachment B).

3. Prepare a written procedure for processing the weaning food formulae (Figure # _____ thru _____); developed by FFP (Attachment C)/make recommendations for improving the weaning food formulae.

- (a) By processing the weaning food formulae we mean

(1) How to Prepare Four (4) Recipes

Procure

Clean

Shape

Cook

Store

Serve

(2) How to Supplement These Recipes With Perishable Items

(3) Frequency of Feeding

Weaning foods

Small snacks

Milk

VISUAL AIDS

How to Shape -make a card showing a chopping action; have

the mother match that action card with the appropriate food

-have the mother match the appropriate food with all of the "How to " actions

-make this a game

4. All procedures will be kitchen tested.
5. All weaning foods will be fed and tested by appropriate human volunteers.
6. All written procedures will reflect conditions, facilities, utensils, etc. as they exist in the typical Afghan village.

IV. DELIVERY:

The first draft will be presented for approval within 15 calendar days of acceptance and the final product will be submitted within 25 calendar days of acceptance.

LIST OF FIFTY (50) AFGHAN FOODS

Almond Meal	Eggs Omlet
Crude	Orange Juice
Chicken	Cauliflower Cook
Liver Lamb	Cabbage Raw
Liver Chicken	Mulberry
Heart Chicken	Cabbage Cook
Broad Beans	Tangerines
Lentils	Radishes Red
Mung Beans	Tomato
Cow Peas	Heart Calf Cooked
Chick Peas	Potato Fried
Sesame	
Wheat Bran	
Rice Bran	
Peas Mature	
Rice Brown	
Carrots Dehydrate	
Turnip Green	
Horse Radish	
Mustard Green	
Oils	
Butter	
Nuts	
Gur	
Sugar	
Honey	
Raisins	
Figs	
Potato	
Kidney Beef	
Heart Cooked Lamb	
Spinach	
Beet Green	
Butter	
Onion Top	
Onion Whole	
Lettuce	

Illustration of Food Groups By Processing Category

I. How to ProcureA. WhenDailyWeeklyMonthly

(Group 50 Foods)

B. Cost1. Cost Groups5 Afs/kg10 Afs/kg15 Afs/kg20 Afs/kg30 Afs/kg40 Afs/kg50 Afs/kg60 Afs/kg70 Afs/kg80 Afs/kg90 Afs/kg100 Afs/kg2. Meat Costs vs Vegetable Protein Costs

Whole chicken

Liver, heart, kidney

Mutton -leg c̄ bone

-chops c̄ bone

steak c̄ bone

Beef -leg c̄ bone

-chops c̄ bone

-steak c̄ bone

Almond meal

Sesame

Crude

Broad beans

Lentils

Mung bean

Wheat bran

Carrots

- (a) Develop a system of comparison.
- (b) The weaning food costs Afs. 2/day; develop the point why family should revise its food expenditure plan by Afs. 2/day to buy weaning food.
- (c) Show how this revision can be made retaining some or more bulk but improving nutrients.

II. How to Clean

(a) Group according method of cleaning (use Purchase Order III-2-(a) format) and following:

Wash Soak	Wash Scrub	Is Cleaned When Cooked	Cannot Be Cleaned	Green Leafy Veggies?

III. How to Shape

Squeeze To Juice	Scrape	Dice	Mash	Dissolve	?
Orange Tangerine Tomatoe	Liver Carrots	Meat Spinach Veg Tops	Vegs Potatoe	Crude Gur Sugar	Honey Lettuce Cauliflower Mulberry Radish Raisin Sesame Cabbage Onion Figs

IV. How to Cook

Drop in Boiling Water & Cook Quickly to Preserve Vitamins	Boil Til Soft	Take From Family Cook Pot, Scrape & Feed to Infant	Soak Overnight Mash & Boil	Does Not Need Cooking

V. How to Store

Buy Fresh Each Day Do Not Store	Store in Cook Place	Store in Clean Screw Cap Jars	Store in Sun

VI. How to Serve to Infants*

In Clean Glass	By Spoon	Clean Bowl	By Cup

* Do not use bottle - too difficult to clean
Always clean cup, spoon, and bowl with boiling water and tea leaves

PROJECT PERSONNEL RECRUITMENT DOCUMENTS

J O B D E S C R I P T I O N

PROJECT CHIEF

NUTRITION/INFECTION CONTROL PROJECT

1. Designs a project for improved nutrition/infection control directed principally to 0 to 5 year old village infants as one kind of minimal health service to be delivered beyond the reach of GOA Basic Health Centers. Project would employ para-trained village health agents and operate within the financial resources presently available to the majority of Afghan village families.

2. Negotiates with the Ministry of Public Health, GOA to secure its approval and participation in this project.

3. Implements a 36 month demonstration project during which period he develops (a) a field methodology for changing village family eating habits and personal family sanitation behavior; (b) a time frame for individual mothers and entire village to commence active cooperation; (c) information regarding the number of VHA's required and the duration of their training to accomplish behavioral change; (d) time frame for the commitment and village financial project, and support to the finally; (e) net cost to the control government.

4. Designs and monitors a perpetual feedback system including simple unequivocal indicators to measure project progress; interprets feedback data and determines reasons for lack or progress; decides when project inputs or methodology are deficient and require modification.

5. Submits periodic progress reports to the USAID and the GOA.

6. Provides leadership to the approximately eight man field team required to carry out this project.

7. Supervises the Deputy Project Chief.

8. Based on the 36 months demonstration project, develops an operating manual for influencing village mothers to change family eating habits and improved hygiene and sanitation behavior; manual will provide the basis for GOA nationwide replication following the methodology developed in this project.

QUALIFICATIONS: Graduate degree in economic/social development of LDC's
Five to 10 years experience in the field
Familiarity with village life in SE Asia
Some knowledge/experience in one or more of the following: Medicine, nutrition, sanitation, home economics, family planning
Male
Local, language facility preferable but not essential
U.S. National

JOB DESCRIPTION

DEPUTY PROJECT CHIEF (RESEARCH ASSISTANT)

NUTRITION/INFECTION CONTROL PROJECT

1. Under the direction of the Chief, Nutrition/Infection Control Project, but with full opportunity to make recommendations and implementation plans for more effective achievement of project objectives, assists the Project Chief to carry out an educational program among mothers in selected Afghan villages to improve family eating and cleanliness habits.
2. Supervises the training and retraining of two or more Afghan women (Teacher/Supervisors to Village Health Agents) who will constitute the project's principal teaching supervisory arm in the training of approximately ten female village health agents in selected Afghan villages; supervises in the villages the instruction program carried out by the VHA Teacher/Supervisors.
3. On the basis of personal observations from her daily visits inside Afghan village homes, and on the basis of daily reports by Teachers/Supervisors to VHA's, gauges project progress and recommends to the Project Chief modifications in the projects educational program content and or methodology to change family eating and cleanliness habits of village mothers.
4. Provides the principal Pharsi/English link between the Teachers/Supervisors to Village Health Agents and the Project Chief; provides the principal eyes for impact of the project on changed behavior in Afghan village homes to which, for cultural reasons, the Project Chief is otherwise generally excluded.
5. Acts for and on behalf of the Project Chief when leading a project team into an Afghan village; acts for the Project Chief during the latter's absence from Afghanistan.

QUALIFICATIONS: Undergraduate degree in economics, sociology, or related fields
 Female
 Fluent in local language
 Familiarity with village life in SE Asia
 Previous experience in Afghanistan
 Some knowledge/experience in one of the following:
 Medicine, nursing, home economics, midwifery,
 family planning or experience related thereto
 U.S. born and educated; could be Afghan national

1/26/75

J O B D E S C R I P T I O N

TEACHER/SUPERVISOR TO VILLAGE HEALTH AGENTS

NUTRITION/INFECTION CONTROL PROJECT

1. Under the general supervision of the Deputy Project Chief, Nutrition/Infection Control Project, undergoes training in the fields of nutrition (including preparation of weaning foods), personal hygiene, sanitation, control of infectious diseases, first aid and demographic mapping, records and reports.
2. Teaches two or more semi literate village women selected from each of approximately ten villages (total approximately 20 women) in the subjects of nutrition (including preparation of weaning foods) personal hygiene, sanitation, control of infectious diseases, first aid, and records and reports; thereafter on the basis of daily visits to one or more of the project villages supervises these village health agents in carrying out an educational campaign in these subjects among village mothers.
3. Assists to evaluate the effectiveness of the methodology employed to achieve project objectives and recommends to the Deputy Project Chief revisions in the methodology.
4. Prepares periodic evaluations of the village health agents which she supervises.

QUALIFICATIONS:

1. On the basis of college education or equivalent life experience brings to the position expertise in one or more of the following nutrition, nursing, education, home economics, child rearing
2. Fluent in Pharsi or Pashtoo (but not English)
3. Leadership qualities and personal dedication necessary to teach village health agents
4. Afghan national
5. Female

VILLAGE SELECTION DOCUMENTS

OUTLINE FOR INITIAL DISCUSSION WITH VILLAGE CHIEFS
AND OTHER VILLAGERSI. DESCRIPTION OF THE PROJECT & SECURING AGREEMENT TO
PROCEED WITH FURTHER INQUIRY

1. We have come to your village to talk about a possible development project.
2. We call it a nutrition/infection control project.
3. It will improve the health of your infants 0 to 5 years old.
4. We will help mothers to learn:
 - (a) How to select and prepare nutritious Afghan foods to feed their 0 to 5 years olds and make them healthy.
 - (b) How to improve their personal hygiene and sanitation practices (and that of their families) which will reduce infant infection, disease, and death.
5. We will do this by teaching two or three of your village women, who will teach all the other women in the village.
6. We will pay a salary to the women selected; after one year, when you have seen the benefits of the project, your village will begin to pay their salary.
7. The results of this effort will be reduced infant illness and death, improved health and strength for school and work, and consequently an increase in family disposable income.
8. A question to the

-village chief	}) WHAT IS YOUR RESPONSE TO THIS OFFER?
-mullah)	
-senior citizens)	
-other villagers)	

II. SELECTION OF THE VILLAGE HEALTH AGENTS

1. What kind of a woman is required to be a village health agent?
She should be
 - a middle age mother who has reared several children successfully
 - a natural leader
 - kind, have a good personality, and be honest
 - able to speak with authority
 - having the respect of the other mothers/
fathers in the village
 - intelligent
 - able to read and write preferably, but this is not essential
 - capable of being trained
 - able to hold the mother's interest

2. Do you believe that you have several women in this village who meet these requirements?
3. During the daytime can these women be permitted to leave this village and go to another village for training-always returning in the evening?

III. OTHER SERVICE PERSONNEL IN THE VILLAGE & OTHER SERVICES TO WHICH THE VILLAGE HAS ACCESS.

1. Does the village have a school and a school teacher; does the teacher have a wife?
2. Is there a midwife in the village?
3. What other medical personnel are there in the village-cauterizer, prayer writer, prayer reciter?
4. How far is the nearest Basic Health Center _____hours _____miles.
5. Does a physician occasionally visit this village?
6. Does a sanitarian occasionally visit this village; what is his program?
7. Do you have an immunization program in this village; what immunizations

IV. FACILITIES AVAILABLE IN THIS VILLAGE AS A POSSIBLE TRAINING CENTER

1. Do you have a space where we could train a group of Village Health Agents?
2. What is the population of this village; persons, families, house?
3. Is the malaria map of this village up to date with regard to population?
4. How far is this village from Kabul _____hours _____miles?

V. VILLAGE CONDITIONS

1. Is this village afflicted with goiter?
2. How many persons from this village have employment in Kabul?
3. Will all the women of one Kala be permitted to get together for discussion and learning from the Village Health Agent?
4. Is there any evidence of significant internal strife/antagonism within the village?
5. What evidence of the villages participation in a prior project can you discover; why did the project terminate?
6. How big is the bazaar; is there a large variety of fruits and vegetables and legumes?
7. Will vendors agree to stock additional foods if there is demand sale?

ABSTRACT

This concrete water-seal slab is most useful for widescale privy programs. It is used to cover an ordinary pit privy.

TOOLS AND MATERIALS

Master molds - Can be purchased from Village Health and Sanitation Project, Ministry of Public Health, Department of Health, Bangkok; Thailand. This aluminum master mold weighs 24 pounds and costs \$7.50 plus shipping charges. Master molds can be made using the entry "Master Molds for the Thailand Water-Seal Privy".

Concrete making materials
 Wood for platform forms
 Reinforcing rod and wire
 Clay
 Crankcase oil
 Beeswax and kerosene (optional)
 3/4" x 3/4" x 5" steel bars

DETAILS

The basic method used for making these water-seal slabs is to cast the slab, bowl, and water-seal trap using three forms:

- (1) A wooden form for shaping the slab.
- (2) A concrete bowl core for shaping the inside of the bowl.
- (3) A concrete core for shaping the inside of the water-seal trap.

Since the three parts of the slab are all cast at one time, the finished privy slab is quite strong. The water-seal trap is curved back under the bowl as shown in Figure 2a.

This makes flushing more difficult, but prevents erosion of the back of the pit on loose soil. The same general method could be used to make a forward flushing trap, Figure 2b.

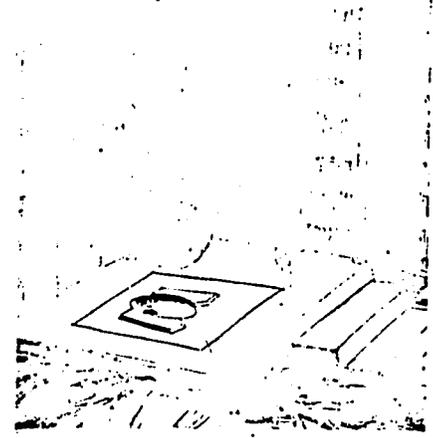


FIGURE 1 SKETCH OF FINISHED PRIVY

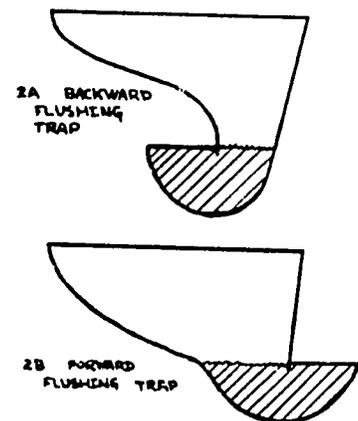


FIGURE 2 WATER SEAL TRAPS

The forms used when making a slab must stay in place till the concrete has gained enough strength to allow their removal. This is usually 24 hours. For this reason, many sets of forms are necessary if a reasonable number of slabs are to be cast every day. Here is where the master molds are needed. One is used to cast the bowl core, and two are needed to cast the trap core.

Casting the Bowl Core

1. Oil the inside of the master bowl mold and insert a 3/4" x 3/4" x 5" steel bar into the bottom.
2. Add a fairly loose mixture of cement and water, called neat cement, to a depth of about 6". Then fill to brim with a 1:1 cement sand mixture. The 1:1 should be firm, not runny, and should be laid into the loose neat cement without stirring to insure a smooth finish on the bowl core.
3. After the bowl core has become firm enough, scoop a depression into the surface to install the two steel hooks made from the reinforcing rod. They should be about 9" apart, and should not protrude above the surface of the concrete. See Figure 3.
4. Allow the concrete to set at least 24 hours before removing the bowl core from the master mold. The bowl core can be used to make another master mold and vice versa.

Casting the Trap Core

Make the trap core using the pair of master molds, which consist of the trap master mold and the insert mold.

1. Add about 1" of 1:1 cement sand mix to the oiled trap master mold and put in some wire for reinforcing. Then fill it with 1:1 almost to the brim. See Figure 4.
2. Put the oiled insert mold into place and scrape off excess. See Figure 5.
3. After 45 minutes remove the insert and add a square sheet metal pipe 3/4" high made by wrapping sheet metal around a 3/4" x 3/4" steel bar.
4. Remove the finished trap core by gently tapping the master mold with a wooden block.

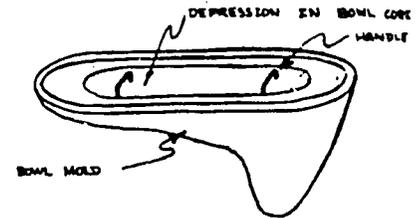


FIGURE 5 BOWL CORE HANDLES



FIGURE 4 REINFORCING THE TRAP CORE



FIGURE 5 PLACING THE INSERT MOLD

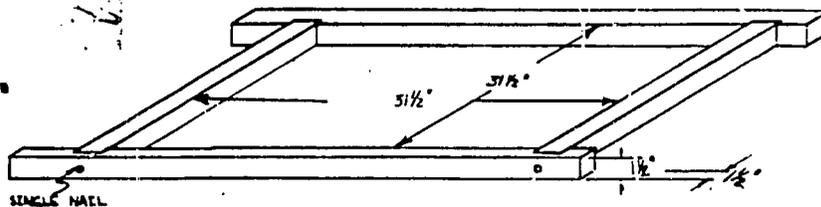


FIGURE 6 FRAME

Construction of the Wooden Slab Form

- . Make a frame of 1 1/2" x 1 1/2" wood with an inside diameter of 80 cm or 80 cm. A notch and single nail on each corner works well. See Figure 6.
- . Make a wooden platform 90 cm x 90 cm out of 1" thick planks. Gouge 1/2" deep footrests if these are desired. See the outline in Figure 7.

Placing the Slab

With these three forms finished you are ready to cast the first water-eal slab.

- . Use a paintbrush to coat the bowl core and the trap core with a layer of wax about 1/8" thick. Prepare the wax by dissolving 1 kilogram of melted beeswax in 1/2 liter of kerosene. The wax coating will last 5 or 6 castings adding 1¢ to the cost of each slab. Wax makes removing the cores much easier, but isn't absolutely necessary.

. Place the bowl core on the wooden slab form and fill all cracks with clay. See Figure 8.

. Oil the bowl, platform and frame.

. Apply a 1/4" thick coat of pasty cement and water mixture to the bowl core and platform. (Many Thai people prefer to spend 25¢ more for an attractive polished slab. To do this, instead of using a mixture of cement and

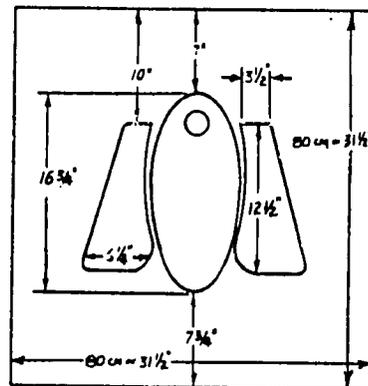


FIGURE 7 PRELY SLAB OUTLINE

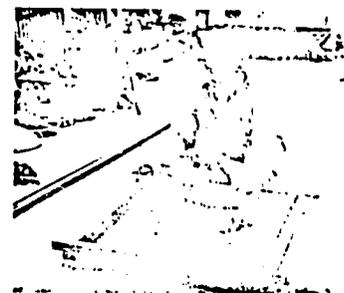


FIGURE 8 SEALING CRACKS WITH CLAY

water, use a mix of 5 cement : 5 color : 1 granite chips. After the forms are removed, polish with a carborundum stone and plenty of water.)

5. Cover the bowl core with a mixture of 1 cement : 2 sand, to total thickness of 1/2". Notice the smooth lip made on the cement 3/8" from the top of the bowl core in Figure 9. This lip is your water seal. Use fairly dry cement and allow it to set for 15 minutes before cutting this lip.

6. Place the trap core on the bowl core and seal the crack with clay. Also add a little clay on each side of the form (near the thumb in Figure 9) to prevent cement from getting to the front lip.

7. Cover with 1 : 2 cement sand mixture to a thickness of 1/2". Do not exceed the 1/2" thickness below the trap core or you will not be able to remove this core.

8. Fill the slab form with a mixture of 1 cement : 2 sand : 3 clean gravel or crushed rock almost to the top. In preparing the concrete, first mix cement and sand, then add gravel and water. Use water conservatively. The looser the mixture, the weaker the concrete will be.

9. Press in 4 pieces of 1/4" steel rod reinforcing. See Figure 10.

10. Fill to top of frame and smooth. Allow at least 24 hours for setting.

11. Remove the frame by tapping lightly with hammer.

12. Turn the slab form over on a wooden stand and use simple levers to remove the bowl core. You must remove the bowl core before the trap core. See Figure 11.



FIGURE 9 MOUNTING THE TRAP CORE



FIGURE 10 PLACING REINFORCING ROD

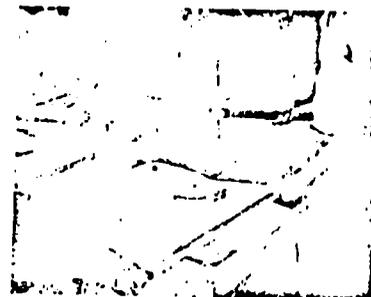


FIGURE 11 REMOVING THE BOWL CORE

13. Tap the trap core gently and slip it out. Add a little water and check to see if your seal is $3/8$ ".

14. Keep the slab damp and covered for a minimum of 3 days and preferably a week to gain strength.

EVALUATION

This method represents the collected experience of a long established privy program in Thailand. The general method should be applicable to other water-seal slab designs.

Material From - Thailand's Water-Seal Privy Program, by Barry Karlin, MPH
Sanitation Advisor, USOM/Lprat.
Thailand.

HOW TO MAKE A WATER FILTER USING TWO EARTHEN JARS
(REFER TO FIGURE III-8)

APPENDIX III

A.M. RAINBOLT - B. GILBERT - J.J. CANU

THE PURPOSE

Is to obtain drinking water i.e. water cleared from earth and most pathogens.

THE PRINCIPLE IS TO:

- Strain the water through a filter. The passage must be very slow.
- The filter should always be moist.
- The filter should be large enough so that there is sufficient water available.

IMPLEMENTENTS

Two containers:

A pot for the reserve water; it should be large enough approximately 60 cm in diameter and half to one metre in height;

Another smaller pot for the filtered water, 30 cm in diameter and 5 to 10 cm higher than the first pot if possible.

Gravel:

5 litres of gravel are necessary with 1 a 3 cm grains.

Sand:

It should not be too fine and can be found in riverbeds.

2 sieves:

One with a 1 mm mesh.

One with a 0.5 mm mesh.

HOW TO MAKE THE WATER FILTER

- 1) Set the pot containing the reserve water in a steady position in the shade and away from the dust. Don't forget to prepare a lid.
- 2) Wash the sand and gravel several times to get rid of all the dirt. In the last rinsing water it is advised to put several drops of chlorine.
- 3) Then put 5 cm of gravel at the bottom of the reserve pot making enough room to place the filter pot inside.
- 4) Prepare the filter pot:
 - a) Make several small holes in it (approximately 20).
 - b) In this pot you will also put 5 cm of washed gravel.
 - c) Then 40 to 50 cm of washed sand leaving enough space at the top of the pot to take some filtered water without disturbing the sand
- 5) Slowly pour water in the reserve pot and fill it almost to the rim.

DIRECTIONS FOR USE

You can take filtered water with a ladle out of the pot. Put some water back in the reserve pot as often as possible; for instance every time you take out some filtered water. Don't forget to put the lid back on.

When the water does not come up anymore in the filter or if it comes up very slowly it means that the filter is dirty and you must wash gravel and sand and put them back as described above. Thus it is useful to have a third pot available with a reserve of water to be filtered.

PRECAUTIONS TO BE TAKEN:

Pour the water very slowly in the reserve pot. Never let the reserve pot stand without water or the water go below the sand level.

It is essential that the population should be explained the necessity of having drinking water and this is particularly important as far as children are concerned. Thus adults and school children must be made aware of the problem; a filter can be made in the health centre or at school and in a third stage the inhabitants can be shown how to make this filter at the village meetings.

N.B. - If the water has a colour or a foul taste you can add some charcoal to the gravel; then you will probably have to throw away the first water which may have a black colour. The charcoal renders the water colourless and takes the bad taste away.

Abstract

Sand filtration does not make polluted water safe for drinking. But a properly built and kept sand filter will prepare water for boiling or chlorination that will make it safe.

Tools and Materials

Steel drum at least 60 cm wide by 75 cm high (2 feet wide by 29½ inches high)

Sheet metal to make cover, 75 cm square (29½ inches square)
Three meters of wood, 5 cm x 10 cm (9.8 feet of wood, 2 x 4 inches)

Sand...one-fifth of a cubic meter (7 cubic feet)

Gravel

Blocks and nails

Pipe to attach to water supply

Optional...valve and asphalt roofing compound to treat drum

Details

Surface water, from ponds, streams or open wells is very likely to be contaminated with leaves and other organic matter. A trickling sand filter can remove most of this organic material but will always allow virus and other bacteria to pass through. For this reason it is always best to boil or chlorinate water after filtering.

There are several sand filters, but the trickling filter is easiest to set-up and understand. The trickling filter uses sand to strain the organic matter from the water, although this does not always stop small pieces of organic matter or bacteria. But in time, biological growth forms on the top six inches of sand. This slows down the flow of water through the sand but will trap more small organic matter and, at times, up to 95 percent of the bacteria. But if not operated correctly, the sand filter can actually add bacteria to the water.

By removing most of the organic matter, the filter...

- removes larger worm eggs, cysts, and cercariae, which are the hardest to kill with chlorine.
- allows the use of smaller and fixed doses of chlorine for disinfection, which results in drinkable water with less taste of chlorine
- makes the water look cleaner
- reduces the amount of organic matter, including living organisms and their food, and the possibility of re-contamination of the water.

Abstract

This method will make 9 pounds of a good quality soap, but can be changed as long as the general principles are followed.

Tools and Materials

Enamel kettle (steel kettles may corrode)

Large wooden spoon

One-half gallon glass or stone jar with cover

Shallow wooden boxes, 1 x 2 feet, with sides

Clean cotton cloth to cover bottoms of boxes and 1 to 2" up the sides.

Materials to keep heat in the boxes while the soap cures (the wooden box can be placed in a cardboard box with dry leaves, cloth or dry straw between the wooden box and the cardboard box)

Thermometer, 0 to 150 degrees fahrenheit (0 to 65 degrees centigrade)

Details

Use six pounds of animal fats or vegetable oils, 2½ pints of soft water and ½ pounds of high grade lye (sodium hydroxide of caustic soda).

- If you want a hard soap for use in hot water, use six pounds of tallow made from melting rendered sheep, cattle or horse fat.
- If you want a good laundry soap, use 3 pounds of tallow and 3 pounds of lard or cooking grease from melted animal fat, skin and bones.
- If you want a fine toilet soap, use 3 pounds of tallow with 3 pounds of vegetable oil.

The best vegetable oils are made from crushing dried coconut meat, palm nut kernels or the outer pulp of the palm nut. The last makes a harder soap than the coconut meat or kernels. Other oils that can be used are castor oil, olive oil, cottonseed oil, soybean oil.

If you do not have rainwater, you can make soft water by adding a pinch of lye to ordinary water. Allow to sit for 3 or 4 days until the hard particles settle to the bottom (a pint of water weighs one pound).

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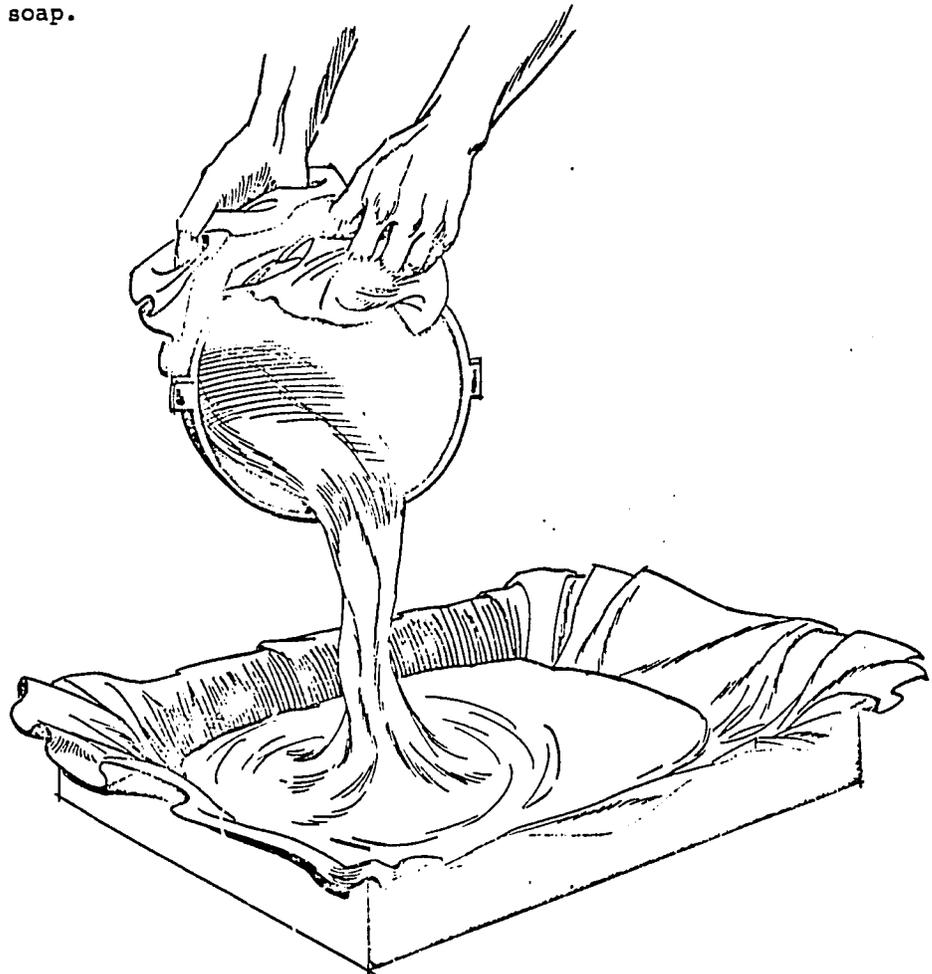
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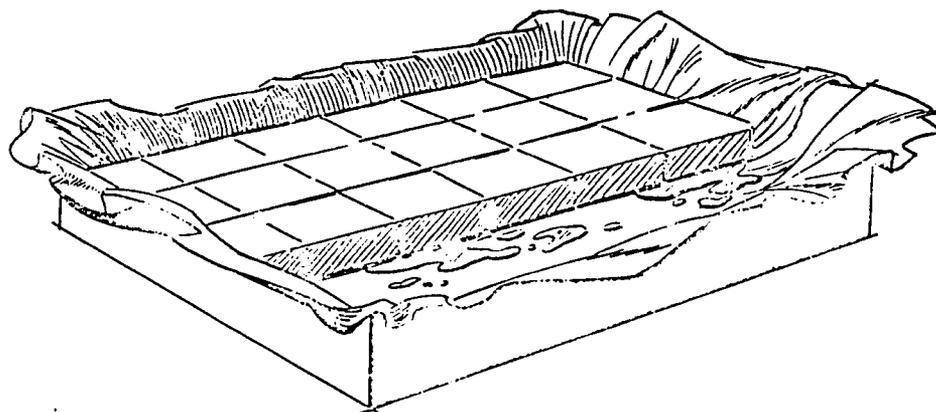
it is better to have the fats too hot than too cold, but the mixture should remain at the thickness of honey.

Pouring the soap...

As soon as the proper thickness is reached, the soap should be poured. The curing box should be made ready while the fats are being melted. Prepare the wooden box by lining it with cotton cloth, wrung dry after soaking in hot water. It is very important that the box be well-insulated, since the soap-making will need a long-time and the heat must be kept in the box.

Pour the soap mixture gently into the curing box, without splattering. Then place the curing box in a warm room where there are no drafts and it will not be jarred. It is important that the curing box is not moved or struck, after the soap is poured, as the fats and other solutions will separate and ruin the soap.





Testing the soap...

At the end of 24 hours, cut off a corner of the soap along its length. If there is no grease on top or liquid on the bottom, turn the box over and remove the soap. Cut into bars with a wire or string.

If there is grease on top of the soap, at end of the first 24 hours after pouring, leave the soap in the curing box for 48 hours or until the grease disappears, then cut the soap into bars.

If there is liquid at the bottom of the pan, when the soap is cut at the end of 24 hours, cut the soap into small squares with a knife and let it stand until all the liquid disappears. If the liquid does not disappear, shave the soap and put it back into the kettle. Add seven pints of water and the liquid remaining in the box. Stir the mixture slowly to the boiling point. When the materials melt together into a smooth mixture, pour the mixture again into the curing box.

Curing and storing...

Cure the cut bars of soap at least two weeks before using to allow any free lye to finish curing the soap. Toilet soaps, however, need at least another two weeks for a total of four or more weeks of curing. Do not allow curing soaps to freeze.

Other points...

A greasy soap shows a shortage of lye or not enough curing time.

Hard crumbly soap may be caused by too much lye or too fast stirring.

Hard brittle soap can be caused by too low a temperature or a long setting.

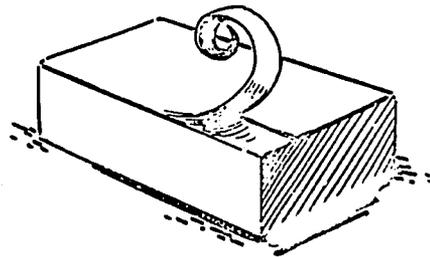
A good soap will shave off in a curl and have little or no taste. If it has too much lye, it will bite the tongue. It is important as a soap with too much lye will fade clothing, weaken cloth and injure the skin.

Qualification

This formula was prepared and tested by the Agricultural Extension Service, Iowa State College, Ames, Iowa.

With proper care and practice, good quality soaps can be made for home use. Other processes using more equipment should be used for making soap commercially.

Material from... Technical Inquiry Service Report IR 25097
Encyclopedia of Chemical Technology, edited by Kirk and Othmer, Volume 12, Interscience Encyclopedia, Inc. New York, 1954



OPERATION OF A SOLAR WATER HEATER

It is possible to make a solar water heater which provides a good quantity of hot water from the sun's rays. A solar water heater can be made from two fifty-five gallon drums, one piece of flat sheet metal; one piece of corrugated sheet metal; two pieces of glass which together equal the size of the corrugated sheet metal, some wood and some 1/2 inch steel pipe.

There are three basic components to a solar heating system and these are as follows:

1. Cold water reservoir
2. Sun absorber (solar water heater)
3. Hot water reservoir

In very simple terms the operation of a solar water heater is as follows:

1. The cold water reservoir supplies water to be heated according to the speed water is taken from the hot water reservoir.

2. The sun absorber is fed cold water by a pipe running from the cold water reservoir. The sun absorber consists of a steel frame, covered on the bottom with the flat piece of sheet steel; on top of this is the corrugated sheet which is riveted or bolted to the flat piece; on top of this is placed two pieces of glass. The top (side exposed to the sun) of the corrugated sheet is painted flat black. The sun absorber is tilted at 45 degree angle directly south. The water flows between the corrugated and the flat pieces of sheet steel.

The sun's rays go thru the glass, hit the flat black painted surface of the corrugated sheet and heat the water which is flowing underneath.

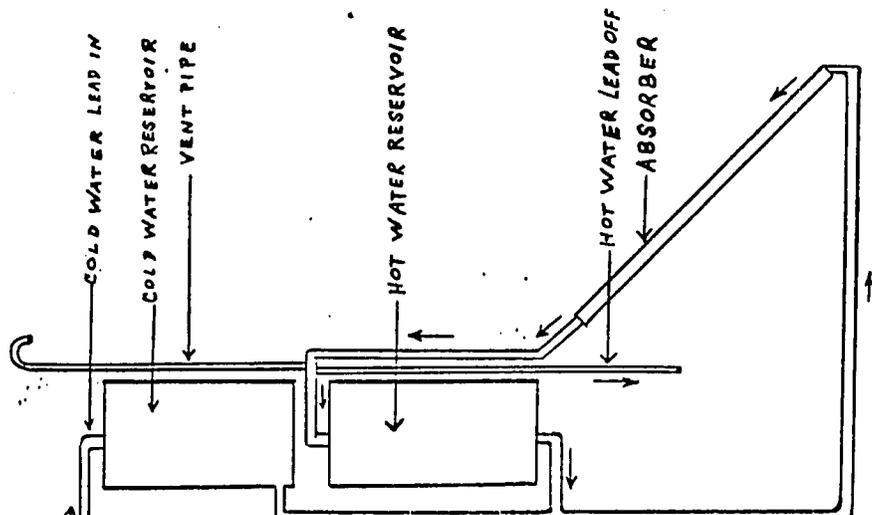
Gravity pressure and the expansion of hot water makes the water move from the absorber to the hot water reservoir.

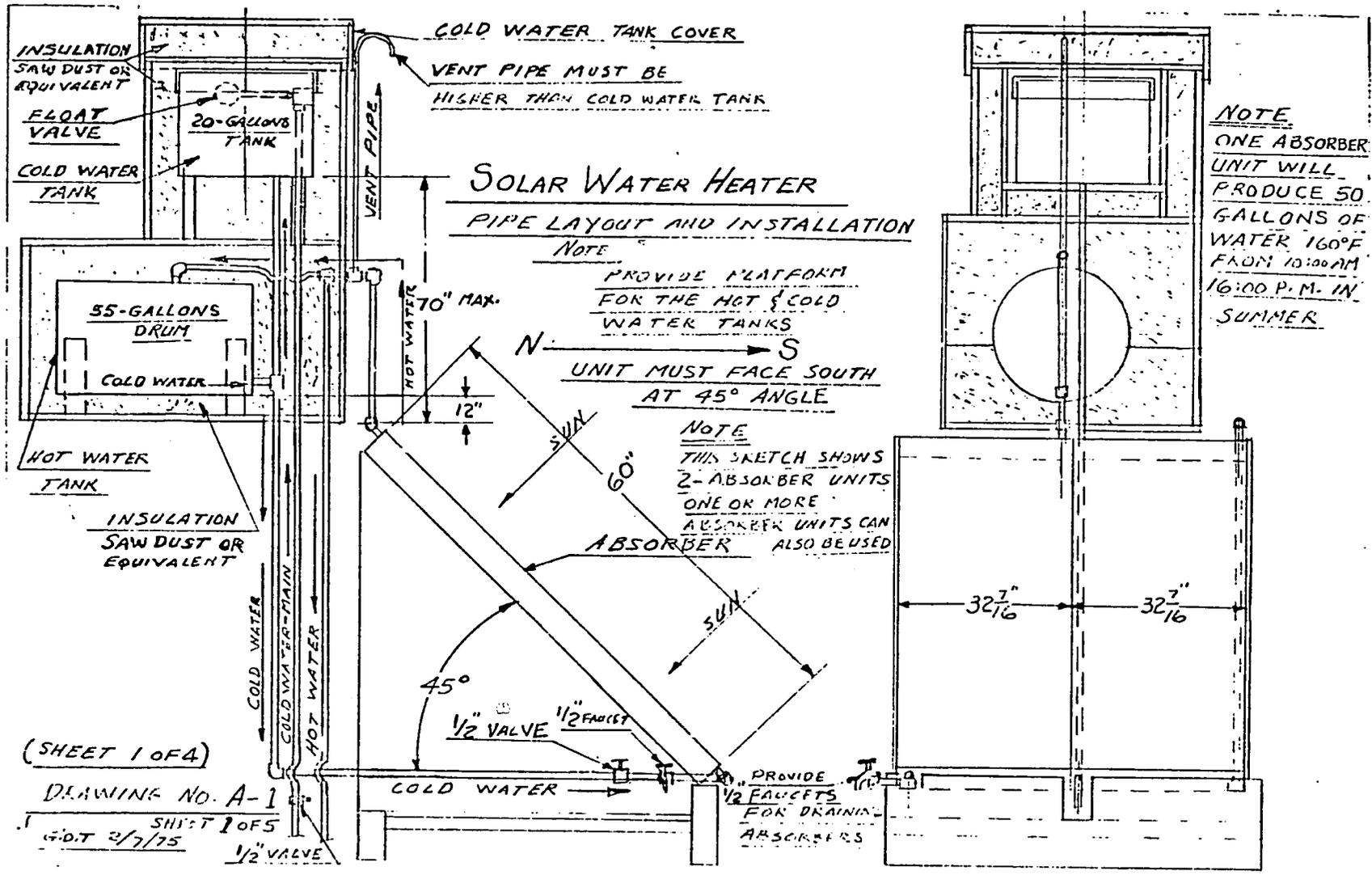
When no hot water is being drawn from the hot water tank, there is a circular flow of water from the hot water tank to the absorber and back to the hot water tank.

Below is a diagrammatic sketch of the solar water heater. Attached are detailed drawings which will enable you to make a hot water heater.

One absorber unit can produce 50 to 60 gallons of water at 160 degree F from 1000 hours to 1600 hours in the wintertime. The approximate cost of this unit (sun absorber) is Afs 3,000 plus two fifty-five gallon drums.

Assistance in the manufacture of a solar water heater can be secured from USAID.





COLD WATER TANK COVER

VENT PIPE MUST BE HIGHER THAN COLD WATER TANK

SOLAR WATER HEATER
PIPE LAYOUT AND INSTALLATION

NOTE
PROVIDE PLATFORM FOR THE HOT & COLD WATER TANKS

UNIT MUST FACE SOUTH AT 45° ANGLE

NOTE
THIS SKETCH SHOWS 2- ABSORBER UNITS ONE OR MORE ABSORBER UNITS CAN ALSO BE USED

NOTE
ONE ABSORBER UNIT WILL PRODUCE 50 GALLONS OF WATER 160°F FROM 10:00 AM 16:00 P.M. IN SUMMER

(SHEET 1 OF 4)

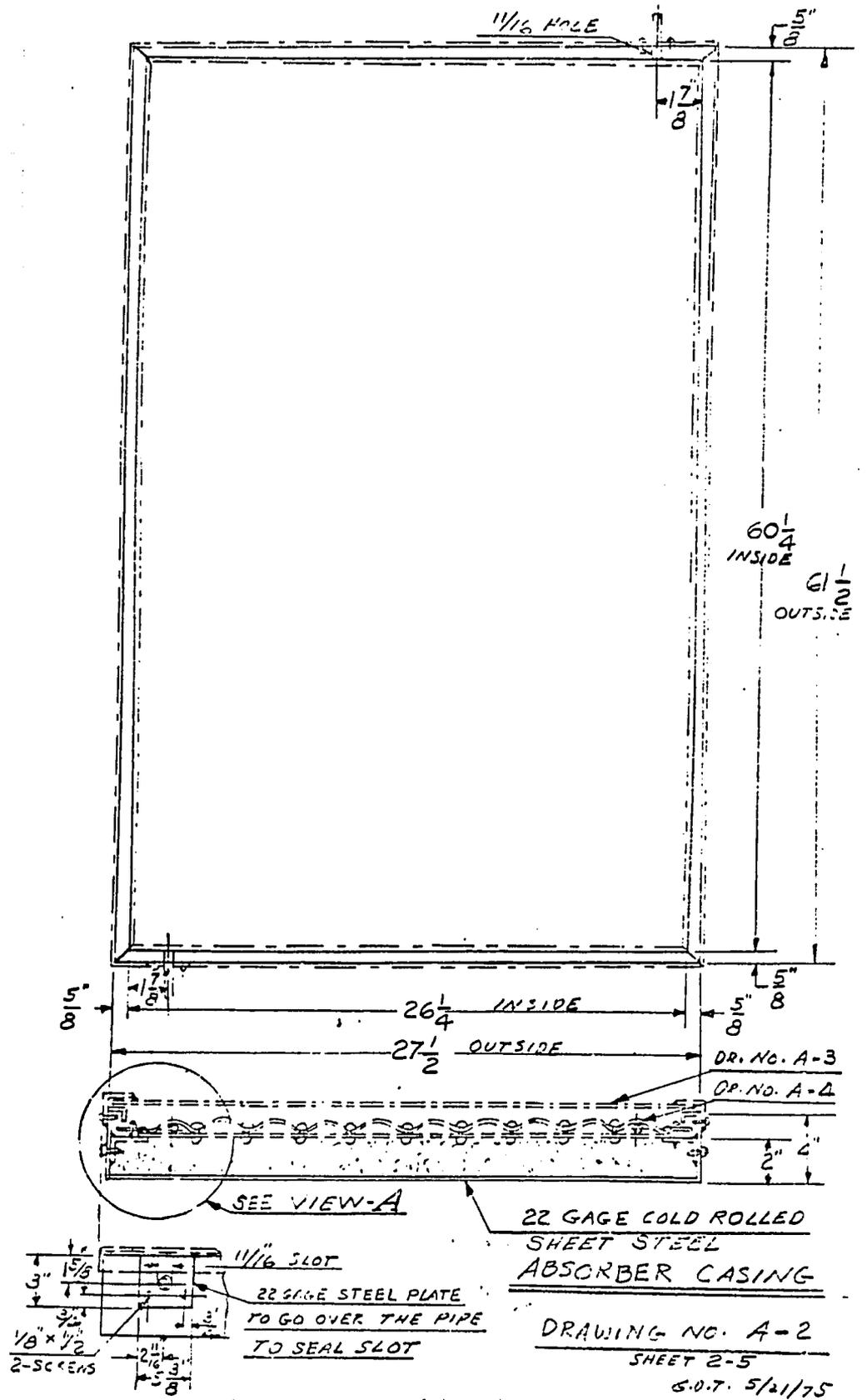
DRAWING NO. A-1

SHEET 1 OF 5

DATE 2/7/75

1/2 VALVE

PROVIDE 1/2 FAUCETS FOR DRAINING ABSORBERS



DRAWING NO. A-2

SHEET 2-5

S.O.T. 5/21/75

