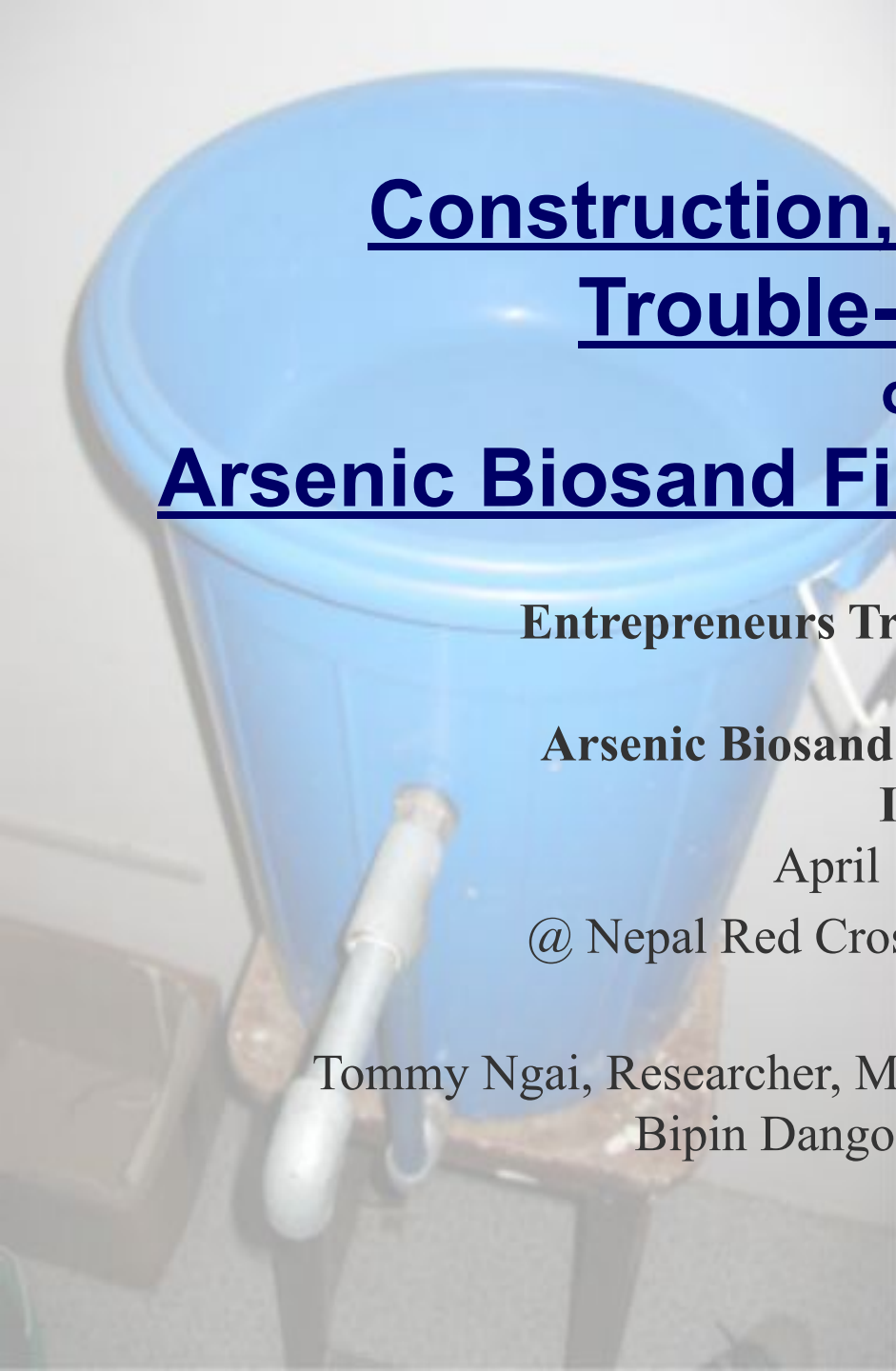




Construction, Installation, & Trouble-shooting **of** **Arsenic Biosand Filter (Kanchan Filter)**

**Entrepreneurs Training on the Promotion
of
Arsenic Biosand Filter (Kanchan Filter)
In Nepal**

April 15 – 16, 2004

@ Nepal Red Cross Society, Birgunj, Nepal

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Presentation Outline

1. Introduction
2. Major Filter Components
3. Filter Construction
4. Filter Installation
5. Trouble-shooting
6. Questions & Discussions



Introduction

How to provide good quality water?

1. Understanding of the water quality, contamination, and risk
2. Develop an option that is technologically (e.g. performance), socially (e.g. easy to use), and economically appropriate (e.g. inexpensive) for the target users
3. Properly install filter using good materials, good construction technique
4. Adequate users awareness on water quality & health, motivation to obtain safe water, and education on filter operation & maintenance
5. Comprehensive monitoring plans and long-term support scheme

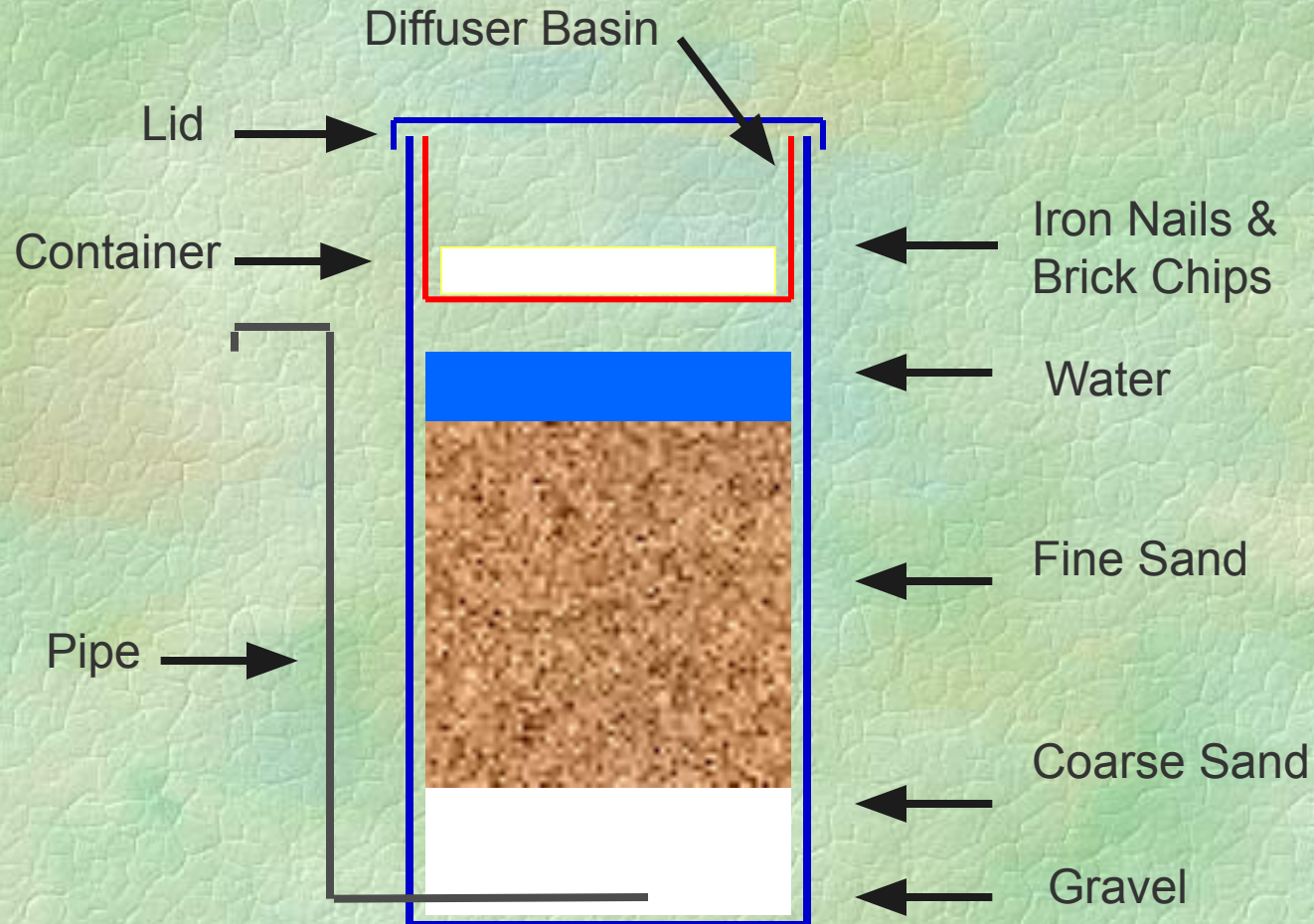
Introduction

Why is proper filter installation important?

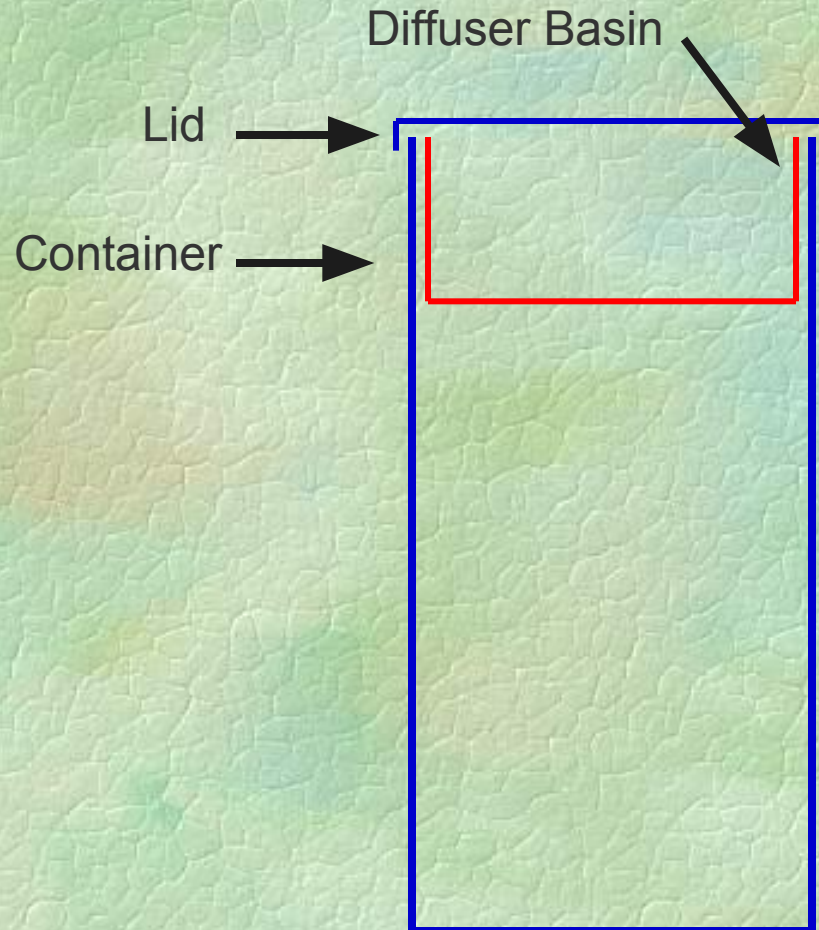
1. To ensure the filtered water is of good quality
2. To make customers happy
3. To increase customers acceptance and usage rate
4. To reduce the need for repair, thus less “down-time”
5. To reduce the need for frequent monitoring and trouble-shooting
6. To save money in the long-term

Major Filter Components

Major Filter Components



Major Filter Components



Specifications:

Container & Lid

☐ Gem model 505

Diffuser Basin

☐ Gem model 1700

Major Filter Components



Container & Lid
□ Gem model 505



Diffuser Basin
□ Gem model 1700

Major Filter Components

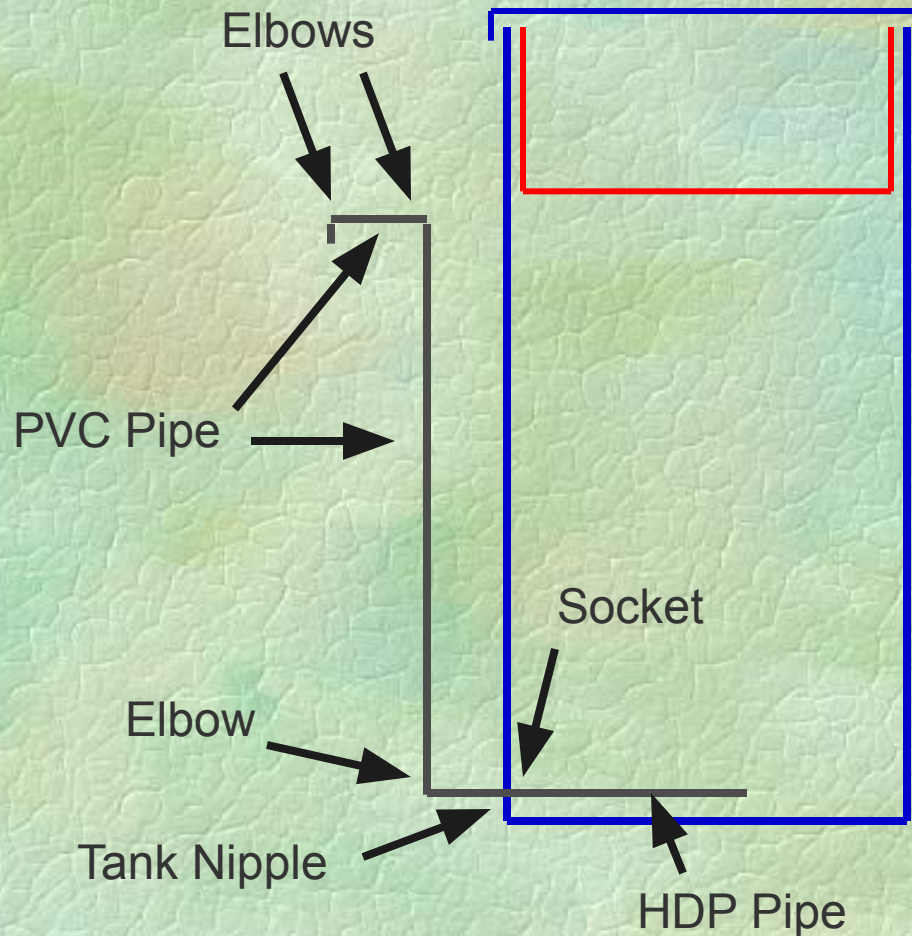
Specifications:

Pipe

- ½ inch PVC
- ½ inch HDP

Pipe fittings

- 3 G.I. elbows
- 1 G.I. tank nipple
- 1 G.I. socket



Major Filter Components



Piping System

- ½ inch PVC pipe
- ½ inch HDP pipe
- ½ inch G.I. fittings

Major Filter Components

Specifications:

Fine Sand

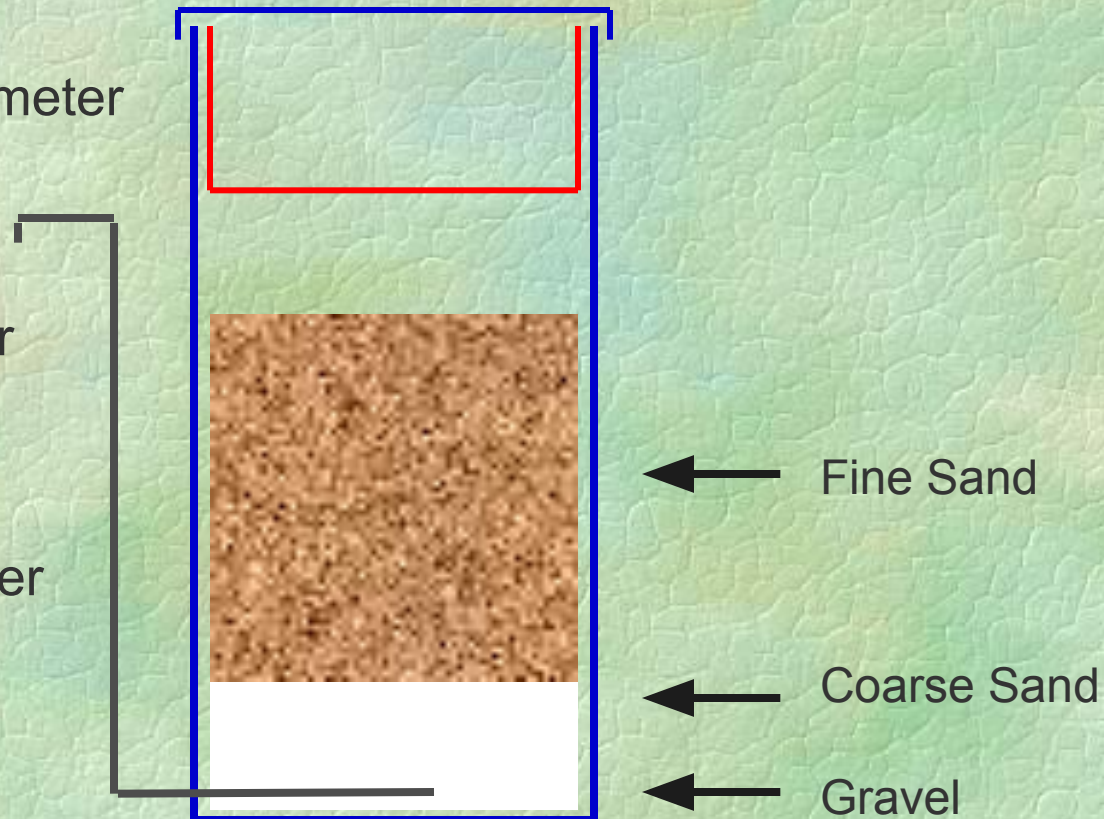
- 22 Liters
- less than 1mm diameter

Coarse Sand

- 4 Liters
- 3 to 6 mm diameter

Gravel

- 4 Liters
- 6 to 15 mm diameter



Major Filter Components



Sand and Gravel can be obtained from nearby rivers or crushers

Major Filter Components



Ideal gravel
– correct size, uniform size,
clean with no silt, dirt, or other
visual contaminations



Poor gravel
– too big size, mixed up large
and small sizes

Major Filter Components



Ideal coarse sand
- may be obtained by sieving



Poor coarse sand
– non uniform size, mixed up
with lots of dirt, silt, and fine
sand

Major Filter Components



Ideal fine sand
- uniform size, little dirt and silt, no large particles



Poor fine sand
– non uniform size, mixed up with lots of dirt, silt, and large particles

Major Filter Components



Avoid sand/gravel sources
with animal contamination



Mediocre quality sand/gravel
can be improved by sieving

Major Filter Components

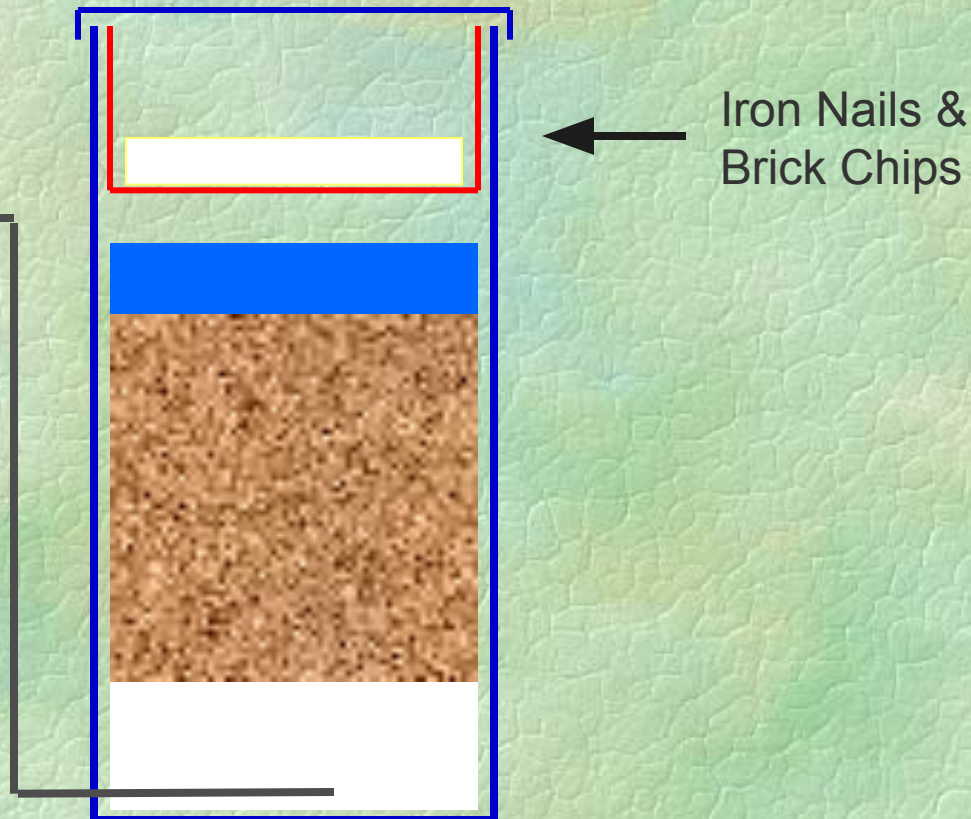
Specifications:

Iron nails

- 5 kg
- smallest size is best
- length < 20mm
- must be non-galvanized (must rust)

Brick chips

- any brick is fine
- about 5 to 10 cm diameter



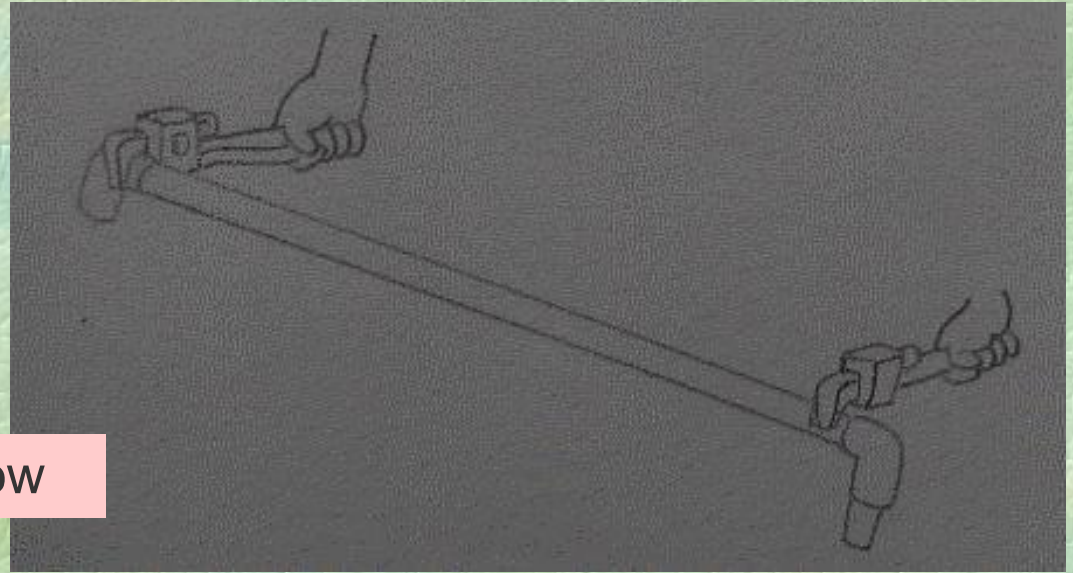
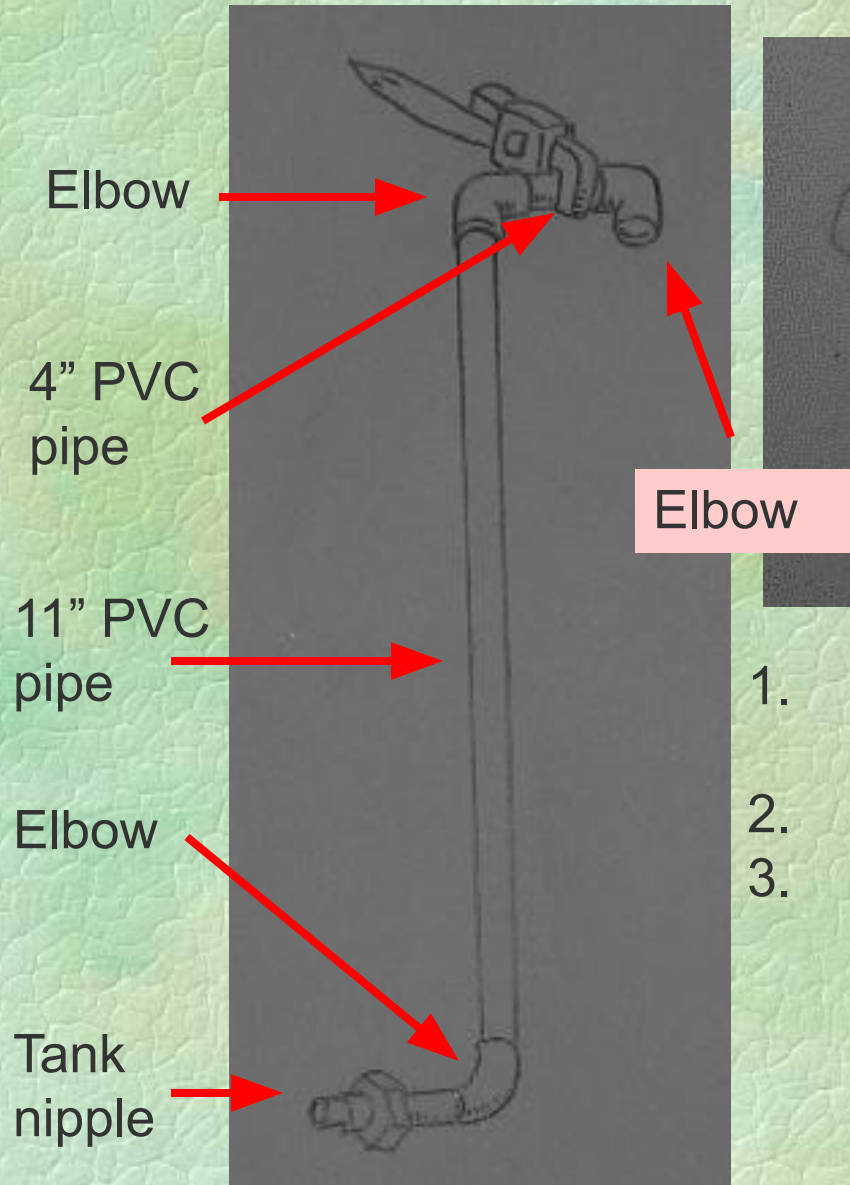
Major Filter Components



Choose the smallest, cheapest, non-galvanized iron nails from your local dealers. Buying in bulk to save money.

Filter Construction

Filter Construction



1. Measure and cut two pieces of PVC pipe (11 inches and 4 inches long)
2. Thread both ends of both PVC sections
3. Attach elbows and tank nipple

Filter Construction



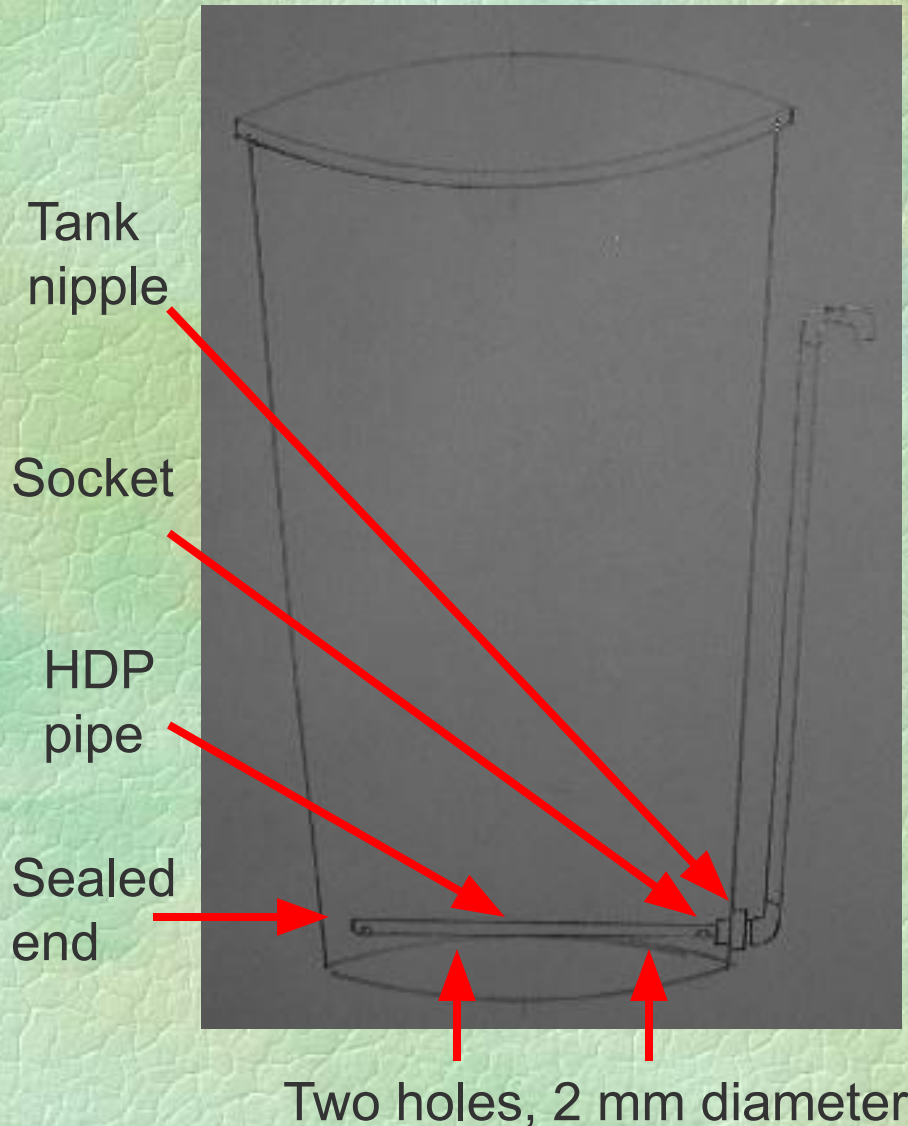
Pipes should be properly sealed with Teflon Tape and Glue to avoid leakage

Filter Construction



4. Make a fire to heat a ½ inch G.I. Pipe
5. Puncture one hole in the Gem505 container, 2 inches from the bottom, using hot pipe
5. Fix PVC piping system to Gem container

Filter Construction



7. Measure and cut HDP pipe 8 inches long
8. Seal one end of the HDP pipe by heating
9. Drill two holes on HDP pipe (at location 2 inches from the sealed end, and at 2 inches from open end), using a hot 2 mm diameter nail
10. Connect the HDP pipe to a socket
11. Connect the pipe-socket to the tank nipple inside the container. The hole should be on the bottom (down) side

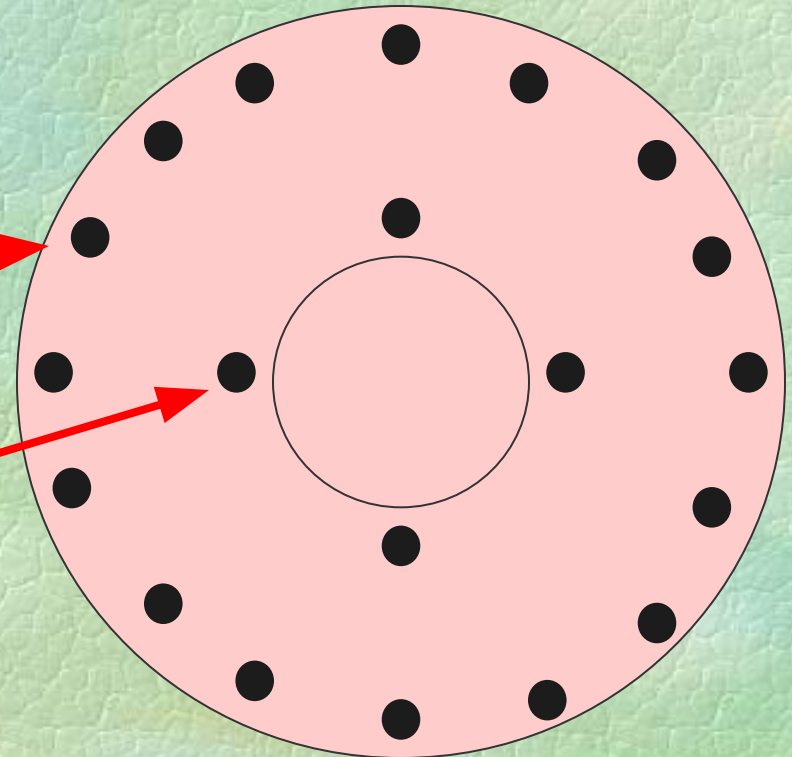
Filter Construction



1. Heat bicycle wheel rod
2. Puncture holes on the bottom side of basin

16 holes in outer ring

4 holes in inner ring



Filter Installation

Filter Installation

1. Add two bottles of Piyush in 10 Liters of water.



2. Pour Piyush water into filter





3. Using a Gem017 pitcher (1 L capacity), measure appropriate amount of gravel, coarse sand, and fine sand.

4. Slowly add gravel, coarse sand, and fine sand. Make sure the interface is flat, and do not mix the gravel and sand

Filter Installation



5. Clean the top layer of sand until you get clear water

Filter Installation



6. Place prior washed iron nails into diffuser box



7. Place prior washed brick chips into diffuser box

Filter Installation



Insufficient brick chips may cause iron nails to disperse. This may jeopardize arsenic removal efficiency as water passes through the basin without contact with iron nails.



Filter Installation

8. Wait for 2 days for the Piyush solution to disinfect the sand and gravel.
9. After 2 days, pour 50 L of water in the filter and discard the filtered water.
10. Now the filter is ready to be used



Trouble Shooting

Trouble-Shooting

Problem No.1 - Too low flow rate (less than 5 Liters per hour)

1. Filter maintenance. Clean the top layer of sand. If doesn't work, then
2. Check clogging in the diffuser basin. Take the basin out and pour water into the basin. If basin clogs, then remove and wash iron nails and brick chip to clean out the dirt. Also wash the basin and clear out any holes that has been blocked by iron sludge/ dirt. If doesn't work, then
3. Remove all sand and gravel. Check for blockage in the pipe. Sieve sand and gravel. Re-install gravel and sand. Keep in mind that that there should be always water in the filter before adding gravel and/or sand to avoid trapped air bubbles. If doesn't work, then
4. Contact ENPHO. This is interesting. We also want to know why.



Top sand layer will clog. It is normal. It is because of the accumulation of dirt, dust, iron particles, and/or other contaminant particles.



Filter maintenance (i.e. cleaning the top layer of sand) can often return the flow rate to normal



Iron nails and/or brick chips can be very dirty. They must be washed to remove dirt and sand particles before placing into the diffuser basin

Remove the diffuser basin to check for clogging in the basin





Iron nails and/or brick chips were not washed prior to installation. Dirt from nails and/or brick clogs the holes in the diffuser basin.

Holes too small will get clogged easily.
Holes too large will allow iron nails to pass.
Proper size is necessary.



Trouble-Shooting

Problem No.2 - Too high flow rate (more than 25 Liters per hour)

1. Check for apparent pipe leakage from outside. If none, then
2. Remove all sand and gravel. Check for seal at the end of the HDP pipe. Check for pipe leakage at pipe joints, tank nipple. Re-seal if necessary. If doesn't work, then
3. The holes in the HDP pipe are too big. Replace the HDP pipe and re-drill the two holes. If doesn't work, then
4. Sand and gravel may be inappropriate. Obtain new sand and gravel of correct size and properly sieved. Reinstall the filter. If doesn't work, then
5. Contact ENPHO. This is interesting. We also want to know why.

Trouble-Shooting

Problem No.3 - Leakage

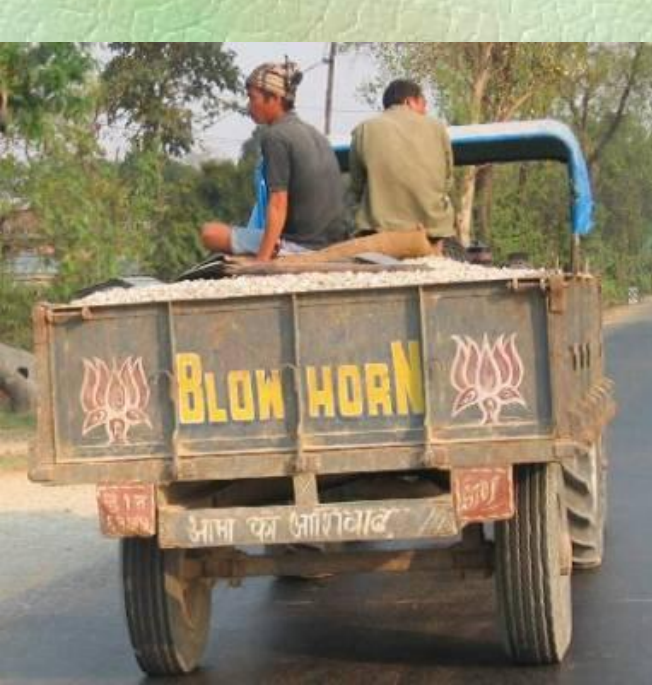
1. If the leakage is on the outside pipe system, re-seal with glue. If not, then
2. Remove all sand and gravel. Check for seal for the entire piping system. Re-seal if necessary. Replace entire pipe or fitting parts if necessary. If doesn't work, then
3. Replacement of the plastic Gem505 container may be needed. If doesn't work, then
4. Contact ENPHO. This is interesting. We also want to know why.

Conclusions

Conclusions

What is your role in filter construction?

1. To gather all necessary construction materials from appropriate sources
2. Buying in bulk can save money
3. To gather all necessary tools for construction
4. To construct the piping system and basin



Conclusions

What is your role in filter construction?

5. To sieve and wash fine sand, coarse sand, gravel, iron nails
6. To measure exact amount of fine sand, coarse sand, gravel, and iron nails, and put them in separate bags
7. To explain to your customers on filter installation
8. To demonstrate to your customers on filter operation and maintenance
9. If necessary, travel to your customers' place and install the filter



Conclusions

What is your customers' role in filter construction?

1. To purchase a “ready” filter package from you
2. To install the filter (putting in sand and gravel)
3. To crush and wash brick chips, and to place in diffuser basin



Thank You.

Thank You.

Any Questions?