SPRING DEVELOPMENT

Springs, particularly in sandy soil, often make excellent water sources, but they should be dug deeper, sealed, protected by a fence, and piped to the home. Proper development of a spring will increase the flow of ground water and lower the chances of contamination from surface water. If fissured rock or limestone are present, get expert advice before attempting to develop the spring.

Springs occur where water, moving through porous and saturated underground layers of soil (aquifer), emerges at the ground surface. They can be either:

o Gravity seepage, where the water bearing soil reaches the surface over an impermeable layer, or

o Pressure or artesian, where the water, under pressure and trapped by a hard layer of soil, finds an opening and rises to the surface. (In some parts of the world, all springs are called artesian.)

The following steps should be considered in developing springs:

1) Observe the seasonal flow variations over a period of a year if possible.

2) Determine the type of spring-seepage or artesian-by digging a small hole. An earth auger with extensions is the most suitable tool for that job. It may not be possible to reach the underlying impermeable layer.

3) Have chemical and biological tests made on samples of the water.

**Dig a small hole near the spring to learn the depth of the hard layer of soil and
to find out whether the spring is gravity seepage or pressure. Check uphill and nearby for sources of contamination. Test the water to see if it must be purified
before being used for drinking. A final point: Find out if the spring runs during
long dry spells.**

**For gravity-fed springs, the soil is usually dug to the hard, underlying layers and
a tank is made with watertight concrete walls on all but the uphill side (see Figures 1 and 2).**

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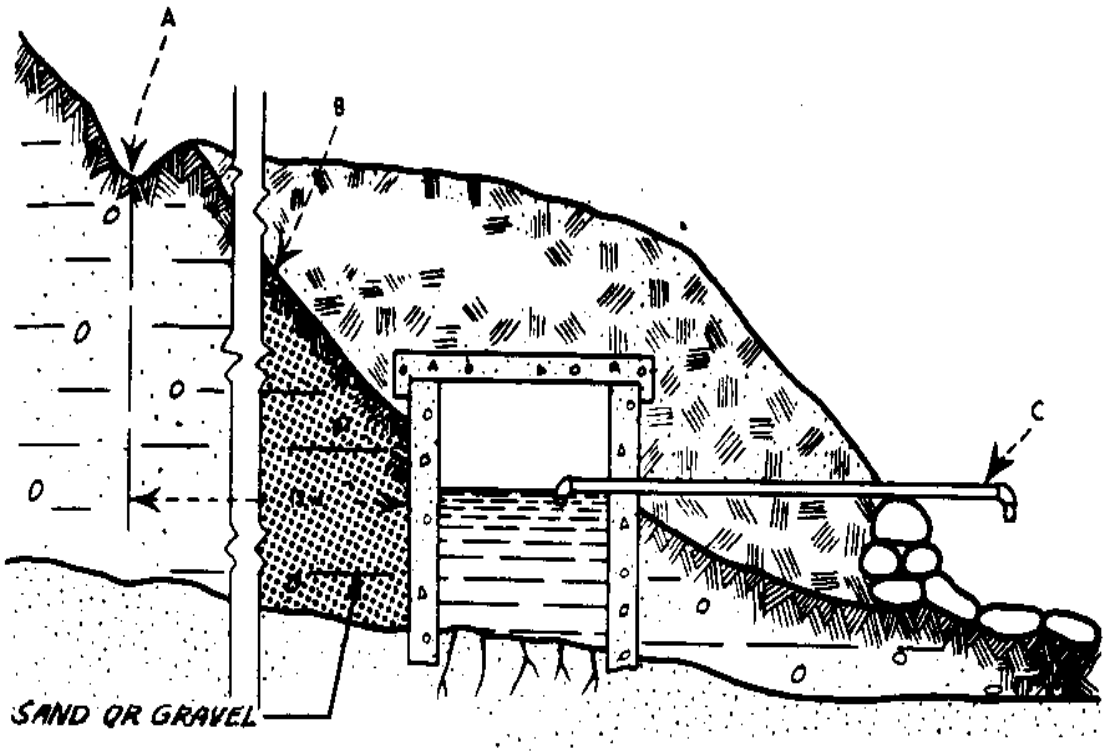
Fig. 1. PROPERLY PROTECTED SPRING (I)



A = Protective drainage ditch to keep drainage water a safe distance from spring
B = Original slope and ground line
C = Screened outlet pipe : can discharge freely or be piped to village or residence

Springs can offer an economical and safe source of water. A thorough search should be made for signs of ground-water outcropping. Springs that can be piped to the user by gravity offer an excellent solution. Rainfall variation may influence the yield, so dry-weather flow should be checked.

The opening on the uphill side should be lined with porous concrete or stone without mortar, so that it will admit the gravity seepage water.

It can be backfilled with gravel and sand, which helps to keep fine materials in the water-bearing soil from entering the spring. If the hard soil cannot be reached easily, a concrete cistern is built that can be fed by a perforated pipe placed in the water-bearing layer of earth. With a pressure spring, all sides of the tank are made of watertight reinforced concrete, but the bottom is left open.
The water enters through the bottom.

Read the section in this handbook on cisterns before developing your spring. No matter how the water enters your tank, you must make sure the water is pure by:

o building a complete cover to stop surface pollution and keep out sunlight, which causes algae to grow.

o installing a locked manhole with at least a 5cm (2") overlap to prevent entrance of polluted ground water.

o installing a screened overflow that discharges at least 15cm (6") above the ground. The water must land on a cement pad or rock surface to keep the water from making a hole in the ground and to ensure proper drainage away from the spring.

o arranging the spring so that surface water must filter through at least 3 meters (10') of soil before reaching the ground water. Do this by making a diversion ditch for surface water about 15 meters (50') or more from the spring. Also, if necessary, cover the surface of the ground near the spring with a heavy layer of soil or clay to increase the distances that rainwater must travel, thus ensuring that it has to filter through 3 meters (10') of soil.

o making a fence to keep people and animals away from the spring's immediate surroundings. The suggested radius is 7.6 meters (25').

o installing a pipeline from the overflow to the place where the water is to be used.

Before using the spring, disinfect it thoroughly by adding chlorine or chlorine compounds. Shut off the overflow to hold the chlorine solution in the well for 24
hours. If the spring overflows even though the water is shut off, arrange to add chlorine so that it remains strong for at least 30 minutes, although 12 hours would be much safer. After the chlorine is flushed from the system have the water tested. (See section on "Superchlorination.")

Sources:

Wagner, E.G. and Lanoix, J.N. Water Supply for Rural Areas and Small Communities.
Geneva: World Health Organization, 1959.

Manual of Individual Water Supply Systems, Public Health Service Publication No. 24. Washington, D.C.: U.S. Department of Health and Human Services.

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