

# The Solar Pasteurization Pond

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Okay, enough of the lawyer talk. Start building!

## 1. Introduction

Lack of good drinking water kills more children (especially in the Third World) than almost anything else. Microorganisms in a water supply can cause dysentery, which can lead to diarrhea and fatal dehydration. Recently, many health workers throughout the world have developed inexpensive pasteurization ponds that provide people with all the fresh water they need.

Most illnesses from water come from bacteria and other microorganisms that can be killed by pasteurization. Pasteurization is heating the fluid (water, in this case) to a temperature of about 175 deg F and holding it for a half-hour. If your health problems can be solved by this method, you can build a pasteurization pond that will provide safe water for a large group.

## 2. How this Article is Structured

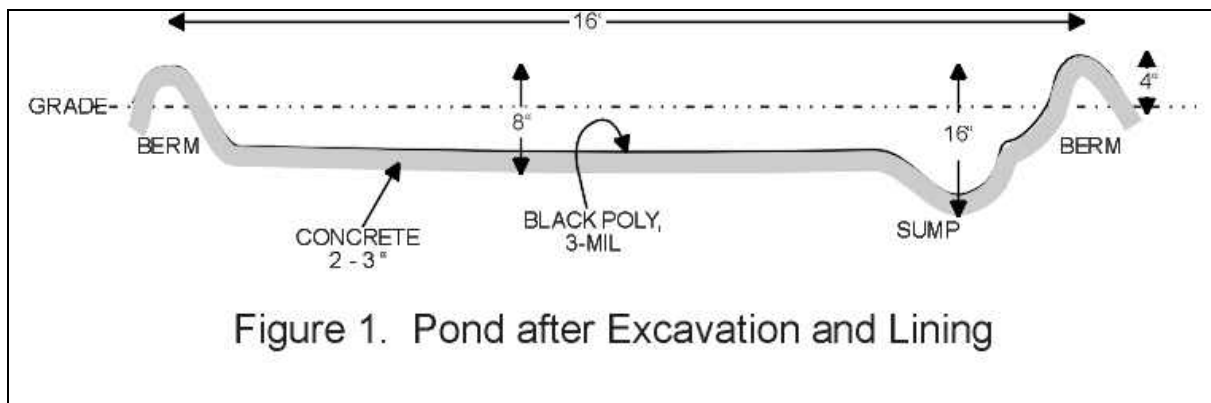
This paper shows how you can build a solar (sun)-powered pasteurization pond. It will take in impure water, heat it to pasteurization temperature, and allow you to collect it. Bear in mind that the dimensions are variable, depending on how much water you need to pasteurize. Section 3 contains detailed construction instructions, and Section 4 explains how it operates.

One document that is not included is a BOM (bill of materials). Since you can build this pond in a wide range of dimensions, each BOM will be unique to your own sizing.

## 3. How to Build the Pasteurization Pond

- Level an area of ground ten by twenty feet.
- Dig a pond in the middle of the cleared area sixteen feet long, six feet wide, and eight inches deep. Use some of the excavated dirt to make a berm around the pond four inches high and four inches wide. At one end of the pond, dig a sump about eighteen inches in diameter and an additional eight inches deep.
- Pack the dirt carefully. If you have it available, line the pond, berm, and sump with chicken wire or hardware cloth, and rebar.
- Using a portland cement/sand/gravel mix available in your area, line the sump, berm, and pond to a depth of 2 or 3 inches. For a two-inch depth, this will require about 38 cu ft or 1.4 cu yd of concrete; for a three-inch depth, you will need about 58 cu ft or 2.1 cu yd. Let the concrete cure for several days as required for your climate and time of year.
- Line the pond with black 3-mil poly sheeting. Use a single sheet if possible.

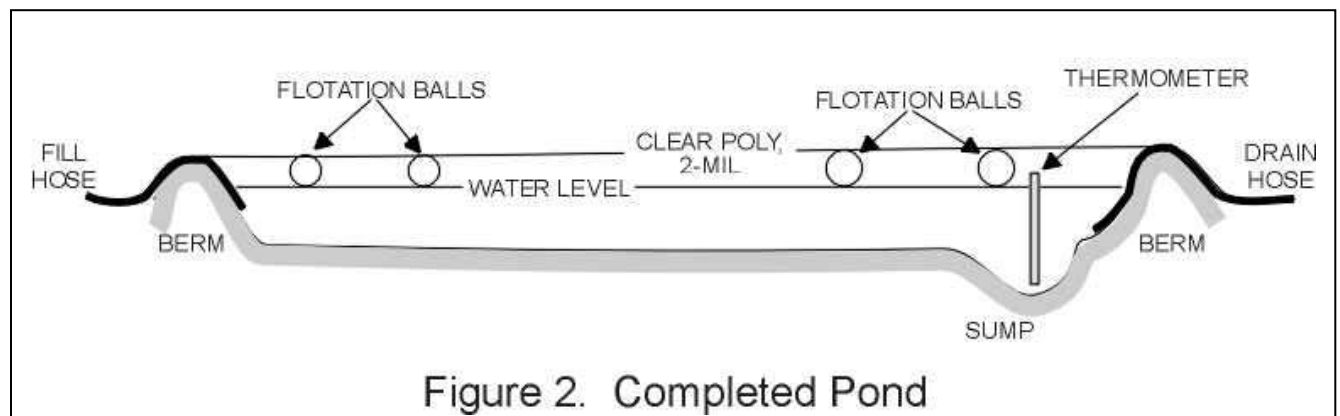
Figure 1 shows what the pond should look now like (in cross section).



Using a hose, fill the pond within three inches of the berm's rim with water. This means the water will be about five inches deep in the pond. Fill the pond from the side away from the sump, and secure the hose in place.

- Place a floating thermometer, available from a pool or hot-tub store, in the water at the sump end, so that the base of the thermometer is in the sump.
- Run another section of hose from below the surface of the water at the sump end, over the top of the berm, and secure it in place.
- Place a dozen or so styrofoam balls on the top of the water, then cover the pond with 2-mil clear plastic. Stretch the plastic over the entire pond, berm, and the two hoses, anchoring it with dirt and rocks. The floating styrofoam balls will support the clear plastic and keep an air space between it and the water's surface.

Figure 2 shows the cross-section again, this time with the water, hoses, balls, thermometer, and sheeting in place.



#### 4. How the Pasteurization Pond Works

When you fill the pond with water via the fill hose (the water should be filtered first to remove suspended particulates), it begins to heat up. The clear plastic acts just like a greenhouse, letting the light through but trapping most of the heat. Depending on the amount of the sunlight and the depth of the water, the water should reach about 170–190 deg F within four to six hours. Since the coldest water is in the sump (because cold water is heavier and sinks), when you see a temperature reading of 175 deg F, you know the rest of the water is at least that hot.

Let the water stay at that temperature for a couple of hours, and drain off the hot water with the drain hose as needed. It should now be free of most live bacteria and other pathogens; and, after cooling in a clean container, is ready for use.

Once you've drained off enough of the pasteurized water, fill the pond again and let the water heat up once more. You don't need to remove the clear plastic cover when re-filling.

If you siphon off just the top two inches of a 16' X 6' pond each day, you will have 16 cu ft or 128 gal of pasteurized water per day. Playing it safe and assuming that you will only be able to get half that much (assuming some cold or overcast days), that's still more than five gallons of safe drinking water per day per person for a dozen people.

Best of all, your fuel source (the sun) is free; and, if you change the plastic cover every six months or so (since UV light may degrade it), you and your group may be assured of safe drinking water indefinitely.