

Forest Water

This paper assumes that at times, such as supporting fire fighter teams, or Hosts in very remote areas, we will have to pump and purify water. Current planning comes from various observations and personal experience engineering irrigation systems as well as providing drinking water in the Baja Desert (for 8 years) that contained both high bacteria and saline content. This included monthly testing of the water which was always of good quality.

There are no new techniques nor equipment being proposed here. Further, the equipment proposed has been approved for the uses recommended herein. This proposal is limited to a list of products being sequenced in a particular order, and assembled into a viable solution.

Whether the water is coming from a well, stream or lake, this system is designed to provide both non-potable, but filtered, chlorine injected water. While this conditioned water may be suitable for human consumption when the source is clean, this cannot be guaranteed on a portable unit such as the *Micki* that must be able to provide safe potable water from a variety of sources and conditions. After the water has been conditioned, we propose that it be run through a UV light filter and Reverse Osmosis System. Testing is recommended in all new installations to ensure water safety. This can be done with a small testing kit when no testing facility is available.

1. The pipe used in a well or river must include a non-corrosive screen to filter out large particles and river wildlife. Inside the screen is a check-valve that prevents water from flowing back to the water source from the piping or hose used to connect the pump to the water source, eliminating pumping the water from the source to the pump every time water is used. This is a similar technique to what is used in modern wells, especially artesian wells.
2. The pump, due to solar considerations, should have a pressurized small holding tank that provides water on demand. This allows water to flow from a Faucet in a normal manner while keeping the pumping (uses considerable energy) to a minimum, only pumping when there is a demand.
3. A 2 filter system should be installed between the water source and the pump. Filters should be in the following order; coarse then fine..
4. The filters should be followed immediately by a chlorine injector system. The portability of the *Micki* dictates that a chlorine pellet system be used rather than a liquid chlorine injector which would require a retention tank. This is just not feasible for a portable system. Additionally, pellet systems are virtually maintenance free, but do use more expensive pellets in lieu of household bleach. We propose a small, on demand pellet chlorine injector before the pump to help insure that water entering the pump and holding tank has minimized any contaminates, keeping the pump and holding tank as clean as possible while providing a chlorine absorption area in the pumps tank which greatly increases the effectiveness of the system.
5. A charcoal filter, also know as a active carbon filter should be placed at the output of the pump to remove any smells or impurities from the water, including the chlorine and its not desirable taste. After this filter, a “Y” is provided. The first is to a faucet for treated water use. The second provides treated water to the potable water treatment system.
6. The potable water treatment systems begins with UV water purification, which is a proven way to kill many bacteria, including most e coli, that are commonly associated with “surface” water, the main source available from forest streams and lakes. This should be installed after the charcoal filter and before the reverse osmosis system.

7. Reverse Osmosis, originally developed by the U.S. Navy to remove saline and contaminants for our Submarines. A three step system is proposed that a) active carbon filtering, b) ultra-fine membrane filtering, and c) “polishing”, which passes the water through another active carbon filter which both purifies and makes the water “*taste good*”.
8. **Note:** Solar Hot Water is also being provided on the Micki as a “plugin”. In the standard configuration, the water provided to the solar hot water system is conditioned, but not run through the “potable” system as there are limits to water volume run through both the UV purification and reverse osmosis systems.

The Forest Water System will provide quick hookup and facets available from both conditioned water and drinking water. An outdoor shower is a consideration.

Hardware

1. [UV Light Filter, 22 watts, 5 GPM](#) \$279 @ klearwaterstore.com
2. [Chlorine “Pellet” Injector - Model 400](#) \$270 @ klearwaterstore.com

Missing: Pump specifications which must be built, filters and other plumbing. I believe that the total cost of this unit should come in between \$1500 and \$1800. This will probably require a trip to a plumbing supply store. More research is required to replicate the pump we used for years, and was replicated and still in use on Cape Cod Farms.

1st Draft