

When the power goes out, one of the first things that homeowners worry about these days is their water supply. Today, most suburban and rural Americans rely on an artesian well for their water. While artesian wells can be very reliable and very safe, it can be very difficult to get water out of your well without power. During the October storms of 2011, in western Mass. we were without power for an entire week. One of the first things we did when we found out how long the outage was going to be was to take a trip to the local supermarket to obtain some bottled water for drinking. When we arrived at the store, we found that most other people in our area were thinking the same thing. The store shelves had already been stripped of most of the supplies of water available. During the coming week, the availability of water for drinking, cooking, and sanitary purposes was always on our mind. It was obvious that we needed to do something to secure our drinking water supply in the event of a power outage since our power grid isn't getting any younger, and we can expect more outages of this kind. Like most other suburbanites, we had an artesian well in our front yard. We had just finished building a wishing well around it, and it seemed like the addition of a hand pump to the top of the wellhead would give the wishing well a little more character while giving us the ability to manually pump water if needed.

Hints: Please note that it will be necessary to have some plumbing and mechanical skills as well as access to machining equipment in order to modify your wellhead. Basic plumbing tools will be necessary, including a large pair of channel lock pliers and a monkey wrench. It is always a good idea to use some sort of Teflon on your pipe joints, especially if you are using stainless steel, to prevent galling. Also, be sure your open well casing is properly covered while your well cap is off.

The first thing we did was to see if any kits were available for retrofitting wellheads with hand pumps. While one or two well contractors at our local home show were able to offer a system, we found them cheaply made and expensive, so we decided to tackle the job ourselves. We sketched up a design that consisted of the following parts:

- A manual hand or "picture pump" as they are called. In this case, we found that it is important to purchase a pump listed for "potable drinking water" as many of these pumps - especially the cheaper ones - contain unhealthy components. Whatever pump you buy, it's "head" needs to exceed the depth of your well water.
- A steel pipe for a riser. For most picture pumps this pipe will be 1-1/4 inches in diameter. The length of the pipe will depend on the height of your wellhead from the ground and how high you would like the pump to be when it is complete. For my pump, I used a 9 inch long pipe.
- A 1-1/4 inch bulkhead fitting to go through the wellhead cap. This turned out to be a fairly difficult item to find. While there were many plastic 1-1/4 inch bulkhead fittings available, it was difficult to find one made of metal at a reasonable price. Since we wanted this to be a good job, we finally selected a stainless steel bulkhead fitting from the Banjo Company which cost around \$100.00, but there are probably less costly alternatives out there. We would suggest against using a plastic bulkhead fitting because of the large forces involved when using the pump. This bulkhead fitting will come with a sealing washer which will be very important later.
- A hose barb connector to go from the bulkhead fitting to the internal hose line. We used a hose barb for a 1 inch plastic PE hose. The manual for the picture pump recommends either a 1-1/4 inch or 1 inch supply hose diameter. We chose the 1 inch diameter hose because it was less expensive. This size seems to work just fine.
- As mentioned above, a length of 1 inch or 1-1/4 inch PE hose just like the hose which is used between the wellhead and your house. This is usually sold in 100 foot lengths, but you may be able to find someone who will sell you a shorter length. The length that we used in the end was 15 feet. We will explain this later.
- Another hose barb to go from the hose to a 1 inch or 1-1/4 inch pipe thread.
- A foot valve for the end of the assembly. Foot valves serve as a combination of a strainer and a check valve. While they are not a necessity, they will make it easier and more reliable to pump.

The Process:



The first thing that is necessary to do is to remove the wellhead cap in order to drill a hole for the bulkhead fitting. The bulkhead fitting that we purchased required a 2-1/4 inch diameter hole. Our particular wellhead cap was made of cast iron and it was necessary for us to bring it to a local machinist to have the work done. While he was drilling the hole, the machinist also milled the underside of the cap as shown here. This provided a surface for the sealing washer and allowed us to build a stop for one of the flats of the bulkhead fitting as you will see later.



The second step is to actually mount the bulkhead fitting into the wellhead cap. It is important to put the wellhead fitting into the cap in the proper direction. It is necessary to put the large flange of the fitting into the underside of the wellhead as shown. This is to ensure that the flange locks against its stop so the fitting will not rotate after the wellhead cap is reinstalled. The sealing washer is important to seal the well against contaminants and it sits on the underside of the bulkhead fitting flange against the machined surface of the underside of the wellhead cap. Thread the nut onto the top of the wellhead cap. Tighten it as much as possible while remembering that the outside threads are left-handed and that stainless steel can be relatively soft compared to regular steel.

The third step is to install the first hose barb to the underside of the bulkhead fitting. Since our bulkhead fitting was 1-1/4 inch and our plastic pipe was 1 inch, it was necessary to install a plumbers bushing first to reduce the pipe size. **To determine the pipe length:** Go to your open wellhead while the pump is not running. Measure the distance from the top of the wellhead down into the casing where the water is sitting with a tape measure then add 10 feet more. *By the way, the measurement to where the water is sitting must be less than the "head" rating of your pump.*



The fourth step is to install the plastic hose itself. The hose is fairly difficult to push onto the hose barb connections, but you should always use a hose clamp as well to ensure the hose does not fall off while it is in the well casing. If you should have problems, heating the hose slightly with a plumbing torch while pushing it on will help.



The fifth step is to install the second hose barb into the bottom of the pipe, and connect the foot valve to it. As you can see here the connection is much the same as the upper end. Again, we chose to use a brass foot valve rather than some of the plastic ones available. This will be deep inside your well and rather difficult to get at after it is installed, so it needs to be reliable. At this point, it is a good idea to fill the pipe up with water to check for any leaks. Tighten up connections if necessary.



The sixth step is to install this assembly into the well. At this point, your assembly will be large and somewhat difficult to handle, so get help if necessary. You should avoid allowing any part to get dust or dirt on it. It is a good idea to shut the power off to the well pump while you perform this step. Get a small bucket filled with a solution of 1/4 cup bleach to 1 gallon of water. This will be used to help sanitize the parts going into the well. Dump the foot valve into the bucket and swish it around briefly. Place the foot valve into the top of the well casing. Get a rag and soak it in the bleach solution, and start wiping the pipe and fittings as you push the foot valve into the well.



The seventh step is to reinstall the wellhead cap onto the well casing. Our well casing had a large O-ring on the outside onto which the wellhead cap had to fit. Be careful that the fit is correct. It is a good idea to install new nuts and bolts at this point, and they should be stainless if you can get them. Install all the nuts and bolts finger tight, and then tighten in a star pattern until the well cap is drawn down secure.



The final step is to install your riser pipe and pump. Once your pump is installed, you should prime it as instructed in the owner's manual, and pump for at least 15 minutes to clear out any rust and bleach in the line. It is a good idea to use the pump at least once a week for the first few weeks to clear out any rust that may start to form in the line as well. Congratulations! You now have a dependable water supply when the power goes out, and an interesting lawn ornament too!