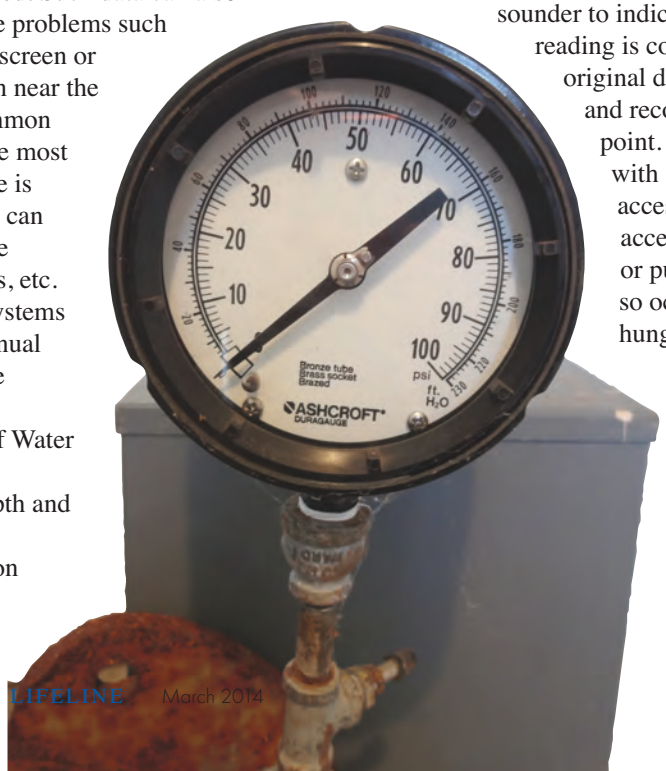
By Jeff Lamfers, KRWA Consultant

The Importance of Monitoring Well Water Levels

One of the more critical, but often ignored, aspects of operating any groundwater system is to monitor water levels in each well. Why is monitoring of water levels so important? First, all water systems want to make sure their groundwater source is adequate and water levels are not declining. If a system is located in an area where water levels are declining due to drought or over-pumping, having water level information provides an early warning so that plans can be made to find other sources of water. It also allows water systems to implement water conservation measures to ensure that remaining water is used only for essentially purposes. Second, measuring drawdown (the number of feet the water table drops when a well is pumping) can provide information on well efficiency. When the feet of drawdown are used with well yield, well efficiency can be assessed. Such data can also help detect performance problems such as plugging of the well screen or water-bearing formation near the well. This is a very common problem in Kansas since most groundwater in our state is comparatively hard and can cause calcium carbonate deposits on well screens, etc. And finally, all water systems that must submit an Annual Water Use Report to the Kansas Department of Agriculture, Division of Water Resources, must supply information on well depth and depth to water.

The two most common methods for measuring water depths are the electric well sounder and the air line method. Both provide accurate information on depth to water.

- Using an electric well sounder is probably the easiest way of monitoring water depths. A basic sounder consists of an electrode, a battery, a pair of insulated wires marked off every foot and a meter, bell or light that indicates when the circuit has been completed and electrical current is flowing. Several manufacturers sell sounders and price varies greatly. Many operators make their own electrical well sounders as well. When using a sounder, slowly lower the electrodes into the well until the meter, bell or light indicates electrical flow. Once electrical flow is indicated, it is a good idea to lower additional wire just to confirm that the end of the electrodes have reached water. Sometimes, cascading water inside the casing can cause the sounder to indicate electrical flow prematurely. If the reading is constant, then pull the wire back to the original depth where current was first detected, and record the feet of wire needed to reach that point. Some of the more common problems with sounders are: 1) Not all wells allow access into the well. However, most have access ports either in the sanitary well seal or pump base; 2) Not all wells are straight, so occasionally the sounder wire can get hung up on the way down. However, this is rarely a problem; and, 3) Using a sounder has the potential to introduce contaminants into the well since the sounder itself likely contains bacteria, etc. on the surface. Therefore, it is a good idea to disinfect the sounder wire with a strong chlorine solution before dropping in the well.



Readings also need to be taken routinely, and not just in reaction to a problem such as drought. If such readings are retained over time, they provide valuable information when the water table is well recharged and other times when not. It is good to have background information on both situations.

- The airline method consists of an open tube (usually 1/8-inch plastic or copper) down into the well, the end of which is lower than the lowest water level. The water level inside this tube will be the same as the water level in the well. Then air pressure is applied to the tube, forcing out all the water inside. The pressure needed to expel the water can then be converted from pounds/square inch to "feet of water" by simply multiplying the psi reading by 2.31. This figure can then be subtracted from the length of the air tube to calculate the depth to water. Some gauges also now have readings for both pressure and feet of water.

For example, you use a bicycle tire pump or compressed gas tank to expel all of the water out of the 80-foot long plastic tube and the pressure gauge on top of the well gives you a reading of 17.3 psi. Then multiple 17.3 psi x 2.31 = 40 feet. That figure should then be subtracted from the length of the air line (80 feet – 40 feet = 40 feet down to water). Fortunately, some of the newer gauges are marked off in feet not pounds of pressure. Two of the more common problems with this method of measuring water depths is that the air lines often develop a small hole and the operator can no longer get an accurate gauge reading as all water cannot be pushed out of the tube. This is obviously more common with the copper tube. The plastic tubes seem to last longer and thus are better. The other problem is knowing the length of the air line. Again, some welldriller will actually write this reading inside the pressure gauge. But most do not. Without the length of the airline, it is impossible to accurately measure the depth to water.

Finally, how often should water depths be checked? This really depends on the situation, but once a year is not sufficient in my opinion. Monthly measurements should be sufficient. However, if your water system is in the middle of a drought and the well appears to now be pumping air due to a declining water table, it may require checking the depth to water on a daily basis. Readings also need to be taken routinely, and not just in reaction to a problem such as drought. If such readings are retained over time, they provide valuable information when the water table is well recharged and other times when not. It is good to have background information on both situations.

Please feel free to contact me if you have questions regarding operation of your well supply, and specifically how to accurately measure static and pumping water levels. I can be reached at 913-850-8822 or jeff@krwa.net.

Jeff Lamfers began work for KRWA in November 2008. Jeff has more than thirty years of regulatory experience in the oversight and operation of water and wastewater systems with the Kansas Department of Health and Environment. He is a graduate of the University of Kansas with a degree in Environmental Studies with an emphasis in aquatic biology.