T

housands of water supply wells are drilled every year. Some of these wells are drilled for individual homeowners, farms, ranches or municipalities. The wells may also be drilled for a water source for industrial use or irrigation. In North America, state or provincial regulations work to ensure that wells are properly drilled and do not pose a threat to valued groundwater aquifers. An important aspect of completing a well is to grout the annular space between the drilled borehole and the casing. This void needs to be properly plugged to avoid any migration of surface water down the well into the aquifer. Diagram 1 shows this annular space being sealed by an impermeable bentonite grout. The well contractors who drill the well require licenses and all the proper training to grout and install a groundwater supply well. The location of the well is registered with the state or province.

In Ontario, where I live, the province monitors new subdivisions with the location of new wells drilled since the early 1990s. Therefore, we know the location and number of legally drilled water wells since that time. If a property owner is drilling a new well, we know whether there are other wells on the property that may need to be abandoned. There are an unknown number of wells that were drilled before it was legally required to document their location and this causes a problem. Many of these wells may not have been properly sealed and may have been left unused for many years. In fact, there are many abandoned wells that nobody even knows exist. In Ontario alone, some estimate that there are as many as 100,000 wells that either need to be upgraded or abandoned. You may ask, why is this of any importance? The problem is that these wells may act as a conduit to allow surface water direct access to drinking water aquifers. Typically, surface water slowly percolates through the ground and is filtered and cleaned as it makes its way to replenish unconfined aquifers. If the annular space between the drilled borehole and the casing is not filled with an impermeable material such as bentonite, the well can be a risk. These abandoned wells that may not be properly sealed or completed, can let contaminated surface water run off get into the aquifers used by residents for their drinking water. In May of 2007, people died and 2,300 became ill from an E. coli outbreak in the Ontario town of Walkerton. The source of the contamination was manure that was carried from surface runoff through a well and into the aquifer, contaminating the town’s drinking water. These old wells need to be identified and either properly abandoned or upgraded to meet the regulations outlined by the state or province. Bentonite sealants are widely used as an extremely effective way to seal these old wells and ensure that they are not a threat to our groundwater reserves. There are many bentonite products that can be used to seal a well. Every contractor should use the appropriate method as outlined in the state or province they are working. Bentonite chips can also provide a good, cost effective seal. They are poured down the well and hydrate on contact with water. It is recommended to screen your bentonite chips to remove any fine powder that has accumulated in the bag. Diagram 2 shows the method to screen the bentonite chips. Coated and uncoated tablets also serve as a good solution. The tablets have a coating on them that inhibits them from swelling for some time when in contact with water. This prevents bridging as the tablets fall through the water in the well. Tablets have a uniform shape and therefore sink quicker than bentonite chips. They also swell quicker and have a greater expansion than bentonite chips. This is due to the grade of bentonite they are manufactured from. Wells are also commonly abandoned by the use of bentonite grout. The grout is mixed at the surface and then pumped from the bottom of the well to the top to ensure that the entire well is sealed. Contractors will typically weigh the grout when they mix it to ensure the proper mix and also weigh it once they have completed the abandonment to ensure that it is pure grout that is coming out of the hole. Some states may require a bentonite cement mixture to abandon wells. This gives the cement the flexibility it requires so it does not crack and create fissures that can act as conduits. Grout mixers are required in order to properly produce the slurry and pump it down the well. Water is a limited resource and good, clean drinking water is becoming more of a rarity. Maybe one day water will be worth more than gold, we certainly cannot live without it. It is the responsibility of everyone to protect our groundwater resources for future generations.

As a homeowner, a corporation or a municipality, it is essential to report any abandoned or unused wells on your property. If you have a well that needs to be abandoned, do your research. Hire a registered groundwater contractor with the experience and equipment to properly abandon your well using high-quality sodium bentonite.

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