



## Ohio Department of Natural Resources Division of Water Fact Sheet

Fact Sheet 92-6

# Properly Sealing Unused Wells

**T**oday there is much emphasis being placed on proper grouting techniques and materials; however, an issue of at least equal importance is that of sealing unused water wells. It is beyond the scope of this fact sheet to address every aspect of this serious environmental topic. This fact sheet will address what types of holes and/or wells should be sealed, as well as the reasons for sealing these wells and the techniques used for properly sealing.

In most cases, unused wells are domestic wells that no longer provide water to the homes for which they were drilled or dug (in other words, they have been abandoned). Other examples include wells that no longer serve a purpose, such as exploratory or monitoring wells, or wells that need repairs that are not economically feasible. These wells should be properly sealed when a replacement well is drilled.

### Reasons for Properly Sealing Wells

Some of the reasons for properly sealing unused wells are the same as those regarding proper grouting of wells. These include:

- Physical hazard considerations
- Prevent surface water contamination
- Prevent the intermixing of water between aquifers
- Preservation of hydrogeologic conditions
- Prevent direct disposal of contamination down unused wells

### Physical Hazard Considerations

The most obvious reason for sealing abandoned water wells is the physical hazard they present to the public. A good example of this danger was seen in 1987 as the nation witnessed the rescue of a small girl from an abandoned water well in Texas. The well in this case was less than 10 inches in diameter. Many of Ohio's domestic wells fall in the 5 to 8 inch diameter range, posing a potential for a similar disaster. Other physical hazards involve small animals falling into these wells. Using a downhole camera, there have

been cases where small animal skeletons (rabbit-sized), were found at the bottom of unused wells, thus explaining the reason for an unsafe water sample in the well and a nearby well in use.

### Prevent Surface Water Contamination

Unsafe water samples can also result when surface contaminants have entered an aquifer through an improperly abandoned well. This situation often occurs when a drilling contractor is called in to diagnose a water supply problem. Upon investigating, the drilling contractor finds that reconditioning the old well would cost more than drilling a completely new well. After getting the owner's okay, he moves over several feet from the old well and drills the new one. The contractor then proceeds to dump the cuttings from the drilling procedure down the old well to "seal" it. Under these circumstances, the new well will not produce a safe sample, because the nearby old well was improperly sealed and provided a direct path for surface contaminants to enter the aquifer.

### Prevent Intermixing of Water Between Aquifers

Proper well abandonment is a must in the case of a multi-aquifer system where the water quality is different in each aquifer. For example, if the upper aquifer is contaminated and is not sealed through the restrictive or confining layer, the potential exists for contamination of the lower aquifer. Contamination occurs because the natural restrictive barrier has been pierced and, if left open, will render the lower aquifer unusable because the poorer quality water in the upper aquifer will be able to migrate downward into the lower aquifer.

### Preservation of Hydrogeologic Conditions

Another reason for properly sealing abandoned wells is to restore an aquifer to its original hydrogeologic condition. For example, in a region where artesian pressure predominates, abandoned wells left unsealed or improperly sealed will cause the hydrostatic pressure to drop due to the unchecked flow of water to the surface. This condition may be evidenced by wells that

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have for years persistently flowed and now have recently stopped flowing. The possibility for regional pressure loss from improperly sealed wells exists where a lower confined aquifer is discharging water to an upper aquifer or to the surface. This water could be of substandard quality.

### **Prevent Direct Disposal of Contamination Down Unused Wells**

Because of the high cost of disposal, some unscrupulous companies or individuals might dispose of chemical wastes down unused wells if given the opportunity. Permanently plugging unused wells makes them inaccessible for illegal disposal.

### **Well Sealing Procedures**

Like grouting, many procedures and different types of materials can be used to seal an unused well. Basic procedures for sealing an unused well are:

- Remove all equipment such as pumps, pressure lines, etc. that may obstruct the placement and performance of the sealing agent.
- An attempt should be made to remove screens, casings and liners, although in many instances this may be difficult or impossible. If possible, the casing and/or liner should be slit, perforated, or ripped to allow the sealing agent to make the best possible seal.
- If the casing cannot be pulled, it should be cut off below ground level. The depth at which the casing should be cut will depend on whether the well was classified as public or private; in most cases four feet will be sufficient.
- Ideally, the material used in sealing an abandoned well should reflect the surrounding geologic formations. Unfortunately, in most instances the formations or their exact depths may not be known. Therefore, it is often hard to match the materials that should be used to the various formations. Many types of suitable

materials are readily available for sealing abandoned wells. For best results, a bentonite clay should be placed in the well from the bottom up to the surface using a tremie pipe. As the well borehole is filled, the tremie pipe should be moved upward until the entire borehole is sealed. This helps to prevent bridging of the sealing agent, which can occur when the sealing material is poured into the well. Some other acceptable sealing materials include neat cement or a combination of neat cement and bentonite.

- The location of the abandoned well and the specifics of the sealing procedure should be recorded and then reported to ODNR and other appropriate agencies (Department of Health, Ohio EPA).

### **Getting the Job Done**

The Division of Water strongly recommends that the drilling contractor hired be experienced in well abandonment techniques and familiar with abandonment materials.

With regard to proper procedures, the drilling contractor should realize that the regulations regarding private and public water wells vary slightly. Although the regulations achieve the same result, there are a few fine points a contractor must be aware of as far as differences between the "Private Water Systems Rules" (Ohio Department of Health) and "Water Well Standards Water Well Waivers" (Ohio EPA) are concerned. Please refer to Division of Water Fact Sheet 92-5, Well Abandonment Regulations, Ohio Department of Health and Ohio EPA.

If you have specific questions regarding well abandonment, contact your local OEPA district office, health department or:

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