

## Over-Drilling: A Simple Approach to Problem Avoidance

### Introduction

Every day on every drilling rig no matter where the jobsite is, there are problems. Some are more demanding than others, but all require some level of attention, often cause considerable stress to the crew, and can be very costly and time-consuming to solve. One of those problems faced on every borehole is landing the casing and well screen at the design depth. Drillers know that having drilled the borehole drilled to its design depth does not signal completion of the well. It's simply the first of several key milestones. Other significant tasks will follow that require more labor, rig time, effort, and various expenditures to install casing, well screen, and place annular fill. So, why would any contractor knowingly risk all of those expended costs when there is the real possibility that the casing and screen cannot be landed at their assigned depths? Good question. Yet, many contractors do just that when all they need to do is give themselves some added assurance (not insurance) of success. This memorandum explains the importance of completing the borehole to an appropriate depth.

### Boreholes

Once a borehole has been drilled and reamed (if so required), the contractor assembles and installs the string of casing and screen. In many instances, to correctly complete the well as designed, the casing and screen must be set at precise depths so that the screen is properly positioned at the depth(s) of the aquifer(s). Casing and screen installation can take many hours to complete and during that time the borehole must remain open and stable. Some caving is not uncommon, and when it occurs the bottom of the borehole begins to fill with sediment and cuttings. Over time, a considerable amount of material can accumulate.

### The Problem

If caving persists in the borehole while the casing and well screen are lowered into it, the bottom of the borehole can fill with enough material that the entire length of casing and screen cannot be installed to the target depth. When that happens, the driller and well owner are faced with a problem. The problem is magnified if there are multiple layers of aquifers that require the well screen to be landed precisely to align with them. This scenario is explained in Technical Memorandum 009-1.

### The Solution

Not all problems are easily solved. However, one is. The solution is simply to drill the borehole at least 20 feet (6 m) deeper than the target depth for the casing and screen. The added open hole will capture caving material and will allow the contractor to lower all of the casing and screen to the design depth. This added borehole will avoid having to face the options described below.

### Undesirable Options

If a contractor is unable construct a well as designed, it is probable that the well owner will be unsympathetic. The options at this point are few and all are undesirable, as follows:

1. Try to convince the well owner that landing the well screen as designed is unnecessary. Convincing the owner of this will be hard, if not impossible, because the well was designed for a specific depth based on some level of investigation that indicated the appropriate depth of the well needed to penetrate the aquifer(s) and produce a reliable source of water supply.
2. Pull out the casing and screen, re-drill the borehole, and reinstall the casing and screen. This will require time, effort and cost to recondition the hole, prepare the casing and screens to be re-assembled, and then re-install it.
3. Force the casing and well screen into the borehole. This is completely unacceptable because the contractor risks causing a structural failure of the casing and/or well screen.
4. Accept a financial loss on the well and try to negotiate with the owner to reduce the construction cost. Both parties are damaged.

### **Summary**

The scenario described above may trigger a very undesirable outcome for both the drilling contractor and the owner. No one walks away pleased. The contractor loses money, damages his reputation, and probably loses his customer. The owner does not get the well completed on time, and may be forced into protracted legal action that could take many months before it is settled. So, a simple problem with a simple solution spirals out of control because the borehole was not deep enough. The solution is simple and cheap..... avoid the problem by drilling an extra 20 feet (6 m) of borehole.

### **References**

- Roscoe Moss Company, 1990, *Handbook of Ground Water Development*, John Wiley and Sons, New York, NY.
- Technical Memorandum 009-1: Deciding on Screen Length for Thinly Layered Aquifers

### **About the Author**

Robert Turnbull is the Chief Hydrogeologist of Roscoe Moss Company. In this capacity he provides technical support, as needed, to consultants, municipalities, and water districts to plan and design water supply wells. He can be contacted for such information or to answer inquiries regarding this technical memorandum via email at [rturnbull@roscoemoss.com](mailto:rturnbull@roscoemoss.com). His website is [www.blhydro.com](http://www.blhydro.com). The corporate website for Roscoe Moss Company is [www.roscoemoss.com](http://www.roscoemoss.com).