Case Study: Increased Production after Upgrading from Mill-Slotted Pipe to Louvered Well Screen

Introduction

Faced with the option of adopting change or simply taking the position of "let's do what we did last time we designed a well", many well operators find that change is difficult. Actually though, such operators (and/or designers) are no different than the guy who says that he's "a Ford guy and would never drive a Chevy". Whether you're buying a new car or designing a new well, those who choose to consider change sometimes find that it can be rewarding. In well design, the potential rewards of change are measured in terms of the well's production and well efficiency which are significant benefits that pay dividends to the well operator for many years. If that sounds overly simplistic, maybe it is. But, it's a fact that well owners and designers often take the easy route and simply pull out the last well construction specification, change the date, and send it out for bid. Those whose specifications include mill-slotted pipe simply repeat what they have always done; that is, they repeat the mistakes of the past.

At a time when most are trying to incorporate efficiency and cost control in well operation, the notion that mill-slotted pipe is the best choice to get high production and efficiency should be scrutinized. This memorandum presents a brief case study of how one water district resisted the temptation to repeat what had always been done in the past. As shown below, the results were highly significant.

Standard Design

Over the years, the standard well design of this water district (and certainly others) was straightforward and one that dated back to a time when well construction progressed from torch-cut slots and mill's-knife slots. Generally, the district's wells were drilled to depths of about 750 feet and completed with 500 feet +/- of double row, mill-slotted pipe with 0.070-inch slots. The double-slotted pattern provided more open area per round, presumably to increase production. On face value this approach might appear beneficial, but the fact is that cutting slots in blank pipe actually lowers its collapse strength, so doubling the number slots of slots per foot had serious strength implications. The district's design combined the double row, mill-slotted pipe with a locally available 4x16 gravel pack. The average well yield in the area was about 3,800 gpm. The typical specific capacity was 80 gpm/foot of drawdown.

The Change

When it came time for the district to construct a new well in an existing well field, the well drilling contractor suggested that the district should consider louvered well screen to see if the change would bring about better performance. Though somewhat skeptical, the district agreed to construct one new well with an upgraded design that combined louvered well screen and a "select", well-graded, gravel pack. Drilling and development methods were the same as those used to construct the existing wells in the same well field.

The Difference

When the new well with louvered well screen was pump tested its specific capacity was markedly higher than the typical district well completed with double row, mill-slotted pipe, so

much so that the district continued to install louvered well screen in other new wells. A review of the pumping test results for 10 new wells showed that louvered screen wells exhibited an average specific capacity of 188 gpm/foot of drawdown, an increase of 123 percent compared to double row, mill-slotted pipe.

Summary

While change is sometimes difficult to accept, the experience of this water district testifies that it can have positive results.

A classical concept of geology is the Law of Uniformitarianism, which states that the present is the key to the past. That is, by examining the geologic processes we see today we can better understand the geologic history and deposition. In well design, designers can use the present results to design for the future. There's no reason to go back to the methods of the past. The mantra should be "design for the future".

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 inquires regarding this technical memorandum via email at rturnbull@roscoemoss.com. His website is www.blthydro.com. The corporate website for Roscoe Moss Company is www.roscoemoss.com.