

The Oxbow

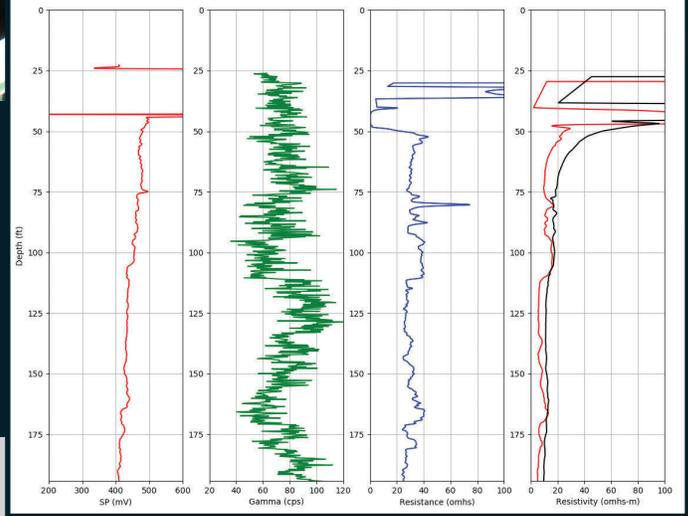
FROM THE NORTH DAKOTA STATE WATER COMMISSION

Driller Terry Olson (left) and Driller's Assistant Dan Bahm (right) drilling the 200-foot borehole.



WATER COMMISSION TESTING & DESIGNING NEW TOOLS

Geophysical Log Using Mount Sopris 40GRP Tool



Graph showing the output from the 40GRP tool.

In early May, hydrologists from the Appropriations Division of the State Water Commission tested a new tool, while installing a new monitoring well. Completion of the new monitoring well on the grounds of the Water Commission Shop Facility in Bismarck provided hydrologists with a nearby monitoring site ideal for testing related to their Remote Water-Level Monitoring Program. During the well's construction, they were able to test out a new borehole geophysical logging tool.

The drill crew drilled a borehole to a depth of 200 feet using the agency's drilling rig. Before the 2-inch well casing was installed, a new geophysical logging tool, a Mount Sopris 40GRP probe, was lowered down the fluid-filled borehole to complete a survey to the bottom.

The tool is used to provide additional lithologic data that supplements the information provided by drill cuttings collected while drilling. Geophysical logging is commonly used in the ground water industry, as well as the oil and gas industry to obtain a continuous record of formation properties from the top to the bottom of a borehole.

The 40GRP tool collects a variety of formation properties during the logging process. The log helps to distinguish aquifer units of sand and gravel, from the less permeable units of clay and silt. The objective for incorporating



Water Commission hydrologists Michael Ginsbach (left) and Rex Honeyman (right) discuss the drill cuttings brought up by the drill rig.



The 40GRP tool.

SWC Annual Water Resource Monitoring

- Install 125-175 Monitoring Wells
- Measure 25,000-30,000 Water Levels In Wells And Surface Water Bodies
- Collect 1,500-2,000 Samples From Wells And Surface-Water Bodies
- Repair And Maintain 3,500-4,000 Measurement And Sampling Locations
- Conduct Aquifer Tests – 1 Or 2 Per Year

data collected from the new 40GRP tool is to provide additional information for correlating aquifer properties and to provide insights towards understanding the water-producing capacity of the state’s aquifers.

“As geologists, we are always trying to put together more pieces of the puzzle of what exists in the subsurface,” said Rex Honeyman, hydrologist and Manager of the Subsurface Exploration Section. “The geophysical logging system, when used in conjunction with the driller’s and geologist’s logs, is very useful in determining the site geology and the characteristics of an aquifer.”

Once the survey was completed in the borehole with the geophysical logging tool, a 2-inch monitoring well was constructed. This monitoring well will be used as a testing site for the Water Commission’s Remote Water-Level Monitoring Program.

The agency has been developing a data acquisition system that pushes water-level data from monitoring wells to an internal database. This approach allows more flexibility in the management of water-level data collection, monitoring the health of electronics locally, and determining when a site visit may be required. When the design is perfected, the Water Commission plans to deploy several systems across the state to continuously record water-levels, and to make the data accessible to the public via the internet.

“We are interested in creating a ‘smart well’ that can tell us what the current conditions are in the aquifer, and if the system itself needs attention, which will be beneficial

to both water managers and the public,” said David Hisz, the hydrologist overseeing this project.

Currently, approximately 80 data loggers take continuous readings of water levels across the state, but that requires agency staff to periodically travel to the well site in order to manually collect the information. The remote water-level monitoring program will provide real-time monitoring of water levels, and allow agency staff to reduce the number of site visits per year.

In 2016, the State Water Commission measured water levels in 4,180 monitoring wells. Manual water level elevations are collected once a month, between April and November. Having more frequent measurements throughout the year, especially in areas where there is more competition for water, is necessary to better manage the state’s ground water resources.