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## Fact Sheet 18h: Monmouth Aquifer Observation Well Located in Northern Kent County, Maryland

*This fact sheet is one in a series presenting results of test-drilling activities conducted as part of the Maryland Coastal Plain Aquifer Study to fill key data gaps. The test wells will help to better understand the structure, flow system, water-bearing properties, and natural water quality of the Aquia-Hornerstown, Miocene-age, Monmouth, and Manokin aquifers on the Eastern Shore of Maryland. In addition, the test wells will provide long-term water-level monitoring for resource assessment and flow-model calibration. The Maryland Coastal Plain Aquifer Study is a long-term, multi-phase initiative for comprehensive regional aquifer assessment developed in response to recommendations of the 2004 Maryland Advisory Committee on the Management and Protection of the State's Water Resources (Wolman Commission). The study is being conducted by the Maryland Geological Survey (MGS) and the U.S. Geological Survey (USGS), with funding support from the Maryland Department of the Environment (MDE).*

### Key Results

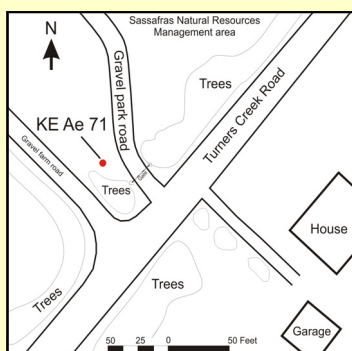
- The Monmouth aquifer, consisting of very fine- to medium-grained quartzose and glauconitic sand, has relatively low transmissivity (66 feet squared per day [ft<sup>2</sup>/day]).
- Water levels respond to changes in atmospheric pressure and tidal fluctuations.
- Arsenic was detected at 16 micrograms per liter (µg/L), exceeding the U.S. Environmental Protection Agency's (USEPA) Primary Drinking-Water Standard of 10 µg/L. No other constituents exceed the USEPA's Primary Drinking Water Standards.

### Introduction

The Monmouth aquifer is a relatively moderate source of water supply in the upper Eastern Shore area. A total of approximately 3.2 and 1.7 million gallons per day have been permitted primarily for irrigation in Kent and Queen Anne's Counties, respectively. The combined effect of pumping likely will result in the lowering of water levels in the region over time. In 2010, an observation well was constructed and added to the Maryland State groundwater-level network to evaluate the effects of pumping. The network is a cooperative effort between the USGS, MGS, and MDE. The well is located near the outcrop/subcrop of the Monmouth aquifer in an area which is likely upgradient in the flow system from the main area of withdrawals in central Kent County. Well construction was funded through MDE as part of the Coastal Plain aquifer study initiative. The well will aid that study by providing additional information on the structure, hydraulic property, and water quality of a locally important aquifer, and by providing critical water-level data for calibration of groundwater-flow models.

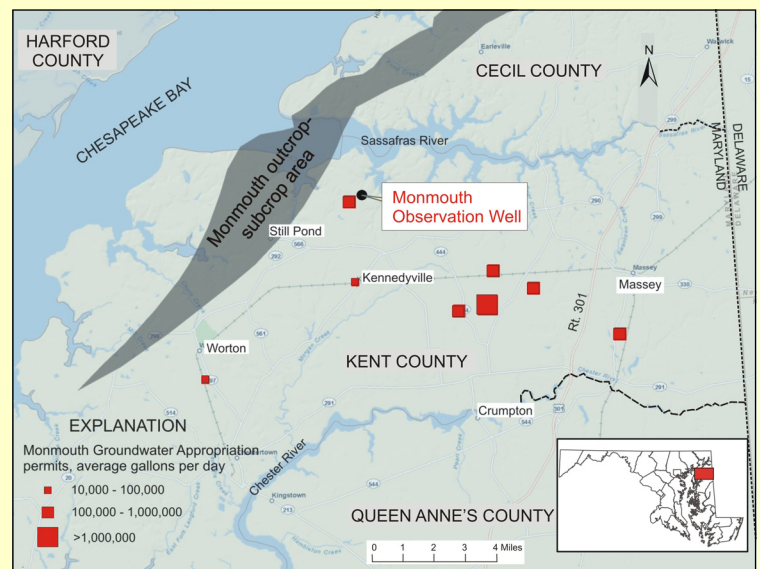
### Well Construction and Testing

Test well KE Ae 71 was drilled on October 4, 2010 to a depth of 290 feet (ft) using a 9 5/8-inch drag bit. Ditch samples were collected at 10-ft intervals and gross lithologic descriptions were made. Geophysical logs (gamma radiation, 16- and 64-inch resistivity, single-point resistivity, self-potential, and 6-ft lateral) were run in the open hole by the USGS Maryland Water Science Center. Well screen (4.5-inch diameter SDR-17 PVC; 0.02-inch slot) was installed from 110 to 120 ft, with a 5-ft cellar to 125 ft. The well was cased to the surface with 4.5-inch SDR PVC pipe. The well was completed with a steel protective casing and locking cap.



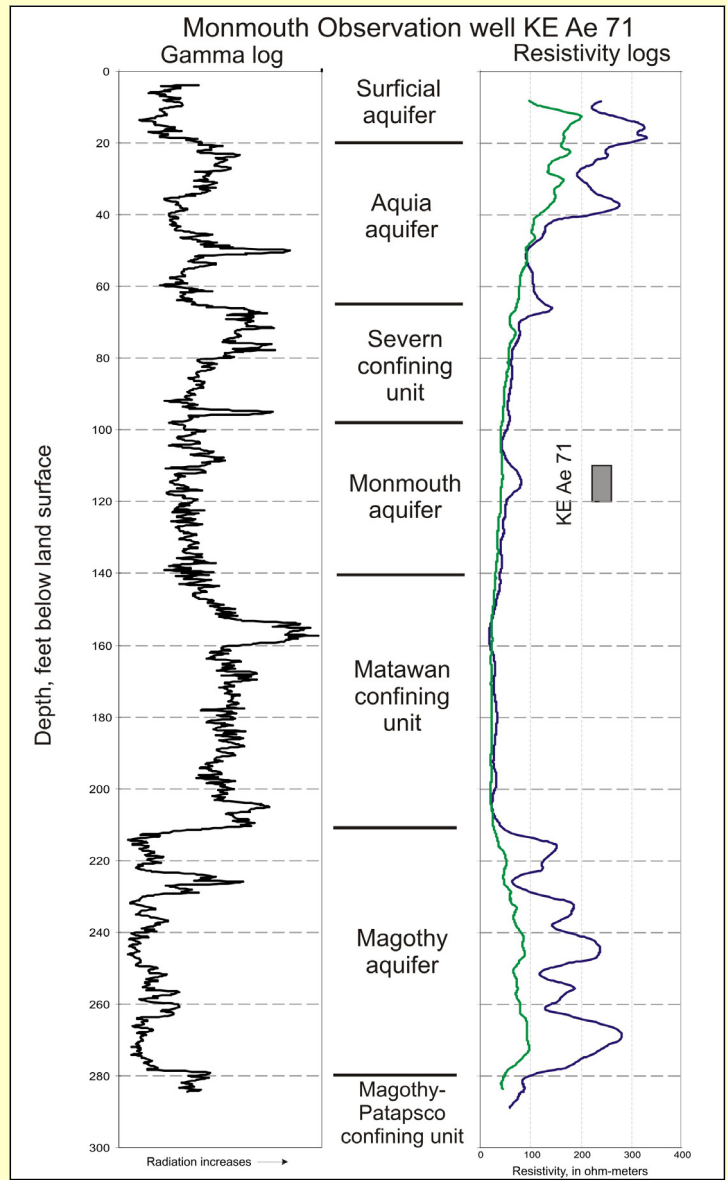
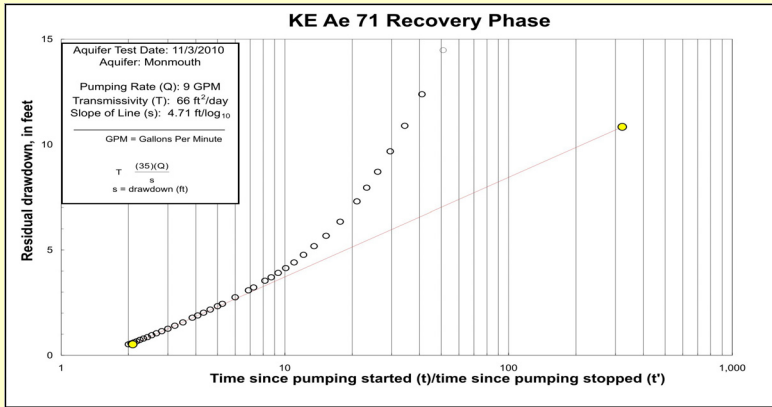
Site Map

The test well penetrated the Surficial aquifer, the Aquia aquifer, the Severn confining unit, the Monmouth aquifer, the Matawan confining unit, the Magothy aquifer, and part of the Magothy-Patapsco confining unit. The Monmouth aquifer at the test site consists of very fine to medium, black, quartzose and glauconitic sand.

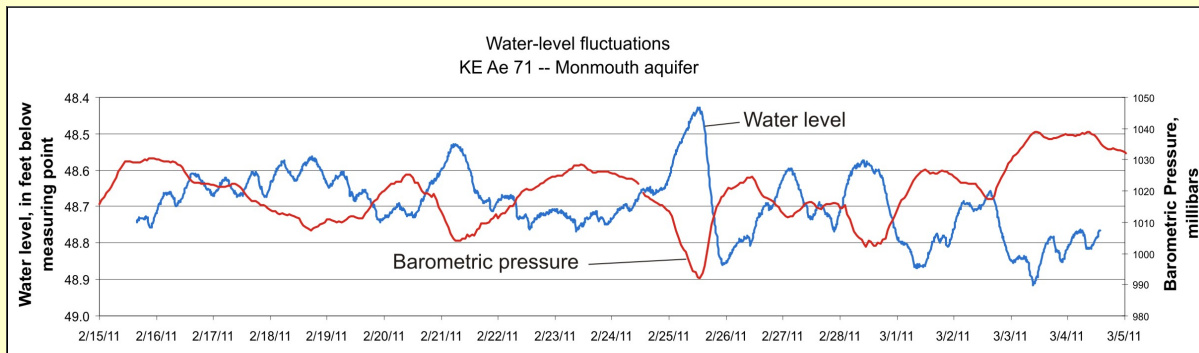


The completed well was developed using compressed air to remove drilling fluid and to clean the well screen. A 3-hour aquifer test was conducted on November 3, 2010 at a constant rate of 9 gallons per minute (gpm). During the test, water levels were measured in the well. The

specific capacity of the Monmouth well at the end of the pumping phase was 0.1 gpm per foot of drawdown. The transmissivity calculated by the Cooper-Jacob method for the recovery phase of the test is 66 ft<sup>2</sup>/day. The static water level measured prior to the aquifer test was 39.8 ft above sea level. During continuous monitoring over several months, water levels changed in response to atmospheric pressure and tidal fluctuations. Water samples from KE Ae 71 collected during the aquifer test were analyzed for field parameters (pH, alkalinity, specific conductance, dissolved oxygen), major ions, nutrients, metals, and radionuclides. The arsenic concentration (16 µg/L), exceeds the USEPA's Primary Drinking Water Standard of 10 µg/L. No other Primary Drinking Water Standards were exceeded.



SUMMARY INFORMATION							
Well number	Permit number	Screened interval (feet below land surface)	Aquifer	Pumping rate (gallons per minute)	Transmissivity (feet squared per day)	pH	Total dissolved solids (residue on evaporation @ 180° C.) (milligrams per liter)
KE Ae 71	KE-95-0814	110 - 120	Monmouth	9	66	7.4	167



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 DNR Publication Number: 12-9192011-527, December, 2011

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