Groundwater Monitoring Program for the Augusta–Richmond County Area

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Problem

Water supply in the Augusta–Richmond County area is provided in part by three well fields that withdraw water from the Dublin–Midville aquifer system—a Late Cretaceous sand aquifer. Low levels of the volatile organic compounds (VOCs) tetrachloroethene and trichloroethene have been detected in a supply well at the northernmost extent of well field number 2. To ensure that groundwater pumping does not adversely affect water levels in adjacent areas and to monitor groundwater quality, the U.S. Geological Survey operates a groundwater monitoring program for the Augusta–Richmond County area. Data from this network provide information to support water-management decisions and serve as a basis for future groundwater-modeling efforts while adding to improved regional characterization of groundwater conditions.

Objectives

• Determine current groundwater levels, flow directions, and water quality of the Dublin–Midville aquifer system in the Augusta–Richmond County area.

• Monitor groundwater fluctuations and trends by operating a continuous water-level recorder network.

• Monitor groundwater quality in the vicinity of well field number 2 and assess the source of low-level volatile organic compounds.

Progress and Significant Results, 2008–2009

• Operated continuous water-level recorder network in wells 30AA06, 30AA33, and 30AA35 near well field number 2.

• Constructed three new test wells at two sites—one two-well site upgradient of well field number 2 (wells 30AA37 and 30AA38), and one single-well site located northwest of well field number 3 (well 29AA42).

• Obtained water-level measurements during June 2008 and September 2009 and constructed potentiometric-surface maps for the Dublin–Midville aquifer system.

• Conducted aquifer test at well field number 2 during October 19–24, 2009, to assess hydraulic properties of water-bearing units and to evaluate changes in groundwater levels and flow directions when various combinations of wells are pumped.

• Collected water samples during June–July 2008 and September 2009 and analyzed for VOCs near well field number 2.

• Collected water samples from selected wells in September 2009 for analysis of stable isotopes to provide an indication of the source(s) of low-level contaminants and age of water.

• Conducted borehole geophysical logging and flowmeter testing, and collected a grab water sample from well 30BB35 upgradient of well field number 2. Results indicate that borehole flow is downward from shallow to deep zones. VOCs were not detected in two water-quality samples collected from the well in September 2009.

Reference

Recovery after wellfield shutdown

Drawdown from pumping well 30AA06

Recovery after shutdown well 30AA06

Normal wellfield operations

See map A

See map B

Water level, in feet below land surface

October 2009

Graph and maps showing water levels in the Midville aquifer system near well field number 2 during aquifer test conducted in October 2009. Water levels shown on the graph are from well 30AA37, located upgradient of the well field. Map A shows water levels about 45 hours following shutdown of well field. Map B shows water levels 24 hours following initiation of pumping in well 30AA06. Note a groundwater divide has formed between wells in the southern part of the well field (not pumping) and the pumping well 30AA06. Groundwater north of this line flows toward well 30AA06, whereas south of the line water flows southeastward.

EXPLANATION

— 150 — Potentiometric contour—Shows altitude at which water level would have stood in tightly cased wells. Dashed where approximately located. Hachures indicate depression. Contour interval variable. Datum is NGVD of 1929

— Groundwater divide

Direction of groundwater flow

30AA37 Well and identification

Results of water-quality monitoring near well field number two during 2008 and 2009 indicate presence of low-level concentrations of volatile organic compounds in some wells. Long-term water-quality monitoring provides information on water-quality trends to help assess contaminant migration. Analysis of groundwater age provides an indication of potential source areas of groundwater withdrawn at the well field. The apparent year of groundwater recharge in shallow well 30AA38, completed at a depth of 120 feet was 1991; whereas deeper wells at the well field (depths typically greater than 250 feet) were recharged between 1980 and 1984.

EXPLANATION

Well and identification with—

30AA25 Undetectable volatile organic compound levels

30AA08 Detectable volatile organic compound levels

30AA11 Detectable levels of chlorine disinfection byproducts