KGS Progress Toward Improved Statewide Groundwater Monitoring and Research

KASMC Executive Meeting, Louisville, Kentucky
December 9, 2015
Groundwater Monitoring Needs Presented in the 2014 Draft KASMC Work Plan:

- Re-establish a statewide groundwater-level observation network.
- Increase groundwater monitoring in areas where withdrawals are, or are expected to be, increasing.
- Collect hydrogeologic data needed to better assess groundwater availability and quality:
  - Aquifer mapping data.
  - Aquifer test (hydraulic) data.
  - Water table or potentiometric surface maps.
- More acquisition of groundwater-quality data.
- Improved public and Internet access to groundwater-related data.
Re-Establishing a Groundwater-Level Observation Network

Status of KGS Observation Well Sites As Of November 15, 2015

- Continuous-Water-Level Observation Well (Data downloaded daily)
- Continuous-Water-Level Observation Well (Data downloaded at 6-8 week intervals)
- Target Area for Proposed Continuous-Water-Level Observation Well

Groundwater Monitoring Sites Maintained By Other Agencies:
- KDOY-ITAC Groundwater-Quality Sampling Sites
- USGS National Climate-Response Network Well

Map Courtesy of Rob Blair, KDOY, 2014
Equipment Installation At the Network’s 1st Observation Well

Monitoring a fractured-karstic limestone aquifer at Kentucky Horse Park, Scott Co.

Clockwise from upper left:

1. Preparation of anchor point (datum) for pressure transducer.
2. Measuring out transducer data cable length.
3. Inserting transducer and cable into well.
4. Final field check of transducer and telemetry equipment.
KGS Research & Monitoring Activity in the Purchase Area

- KGS Drilled and Instrumented Two New Observation Well Clusters.
- Collecting Natural Gamma Logs, and other Geophysical Data, to Improve Identification of Subsurface Aquifer Boundaries and Confining Units.
- Collected Additional GWL Measurements and Water Well Data, and Conducted Specific Capacity Tests of Irrigation Wells at Clarks River Wildlife Refuge.
KGS MSU Observation Well Cluster

at Murray, Calloway Co., KY

<table>
<thead>
<tr>
<th>MSU #1 Gamma-ray</th>
<th>Litholog</th>
<th>Hydrogeologic unit</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Clay</td>
<td>Lower Wilcox aquifer</td>
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<tr>
<td></td>
<td>Gravel</td>
<td>Midway confining unit</td>
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<tr>
<td></td>
<td>Silt/clay</td>
<td>McNairy aquifer</td>
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<tr>
<td></td>
<td>Sand</td>
<td>Unnamed units</td>
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SWL/TD:

- **MSU #2**: 45/150 FBLS
- **MSU #1**: 150/350 FBLS
First Transmitted Hydrograph Data for Observation Wells MSU#1 and MSU#2

(Raw data, water levels reported in feet above transducer)
KGS Hickman Co. Observation Well Cluster
near Clinton, KY

SWL/TD:

HICKMAN #2  81/180 FBLS
HICKMAN #1  84/380 FBLS

Lithology Hydrogeologic unit
Silt/clay Soil/loess
Clay Unnamed unit
Sand Upper Claiborne aquifer
Clay Middle Claiborne confining unit
Sand Middle Claiborne aquifer
Location of the Hickman Observation Cluster Relative to Some High-Yield Water Wells
First Hydrographs for Hickman Co. Observation Wells #1 and #2

(Raw data, feet above transducer)
Creating an Public Aquifer Test Archive and Webpage

Aquifer Test Data Compiled by KGS

- ▲ Site of Existing KGS Aquifer Test Data.
- ● Site of Planned KGS Aquifer Test (early 2016).

KGS intends to collaborate with USGS, among others, to obtain and compile additional existing aquifer test data.
Recent KGS Aquifer Test—Elizabethtown well field

Municipal supply wells completed in a karstic limestone aquifer
Exploring Use of “Story Map” Web Design for Presenting Aquifer-Test Data:

https://storymaps.arcgis.com/en/
Lastly; Upcoming KGS Research Project to Characterize GWQ in Areas of Enhanced Oil and Gas Extraction, Eastern Kentucky
Objective is to Characterize Ambient GWQ and Collect Isotope Data from Representative Sample of Water Wells in the Berea Sandstone-Rogersville Shale Play Area

Study area (yellow counties) and geographic distribution of Berea oil and gas completions in eastern Kentucky (2,778 wells). Oil production occurs predominantly in northeastern Kentucky while gas production occurs in southeastern Kentucky. Green hatched box is approximate location of sampling transect.

Up to 50 wells in this target group are to be sampled beginning January 2016.
Summary: KGS Activities to Improve GW Monitoring

✓ Began re-establishing statewide network of long-term water-level observation sites.

✓ Conducting focused groundwater research to better characterize the aquifer system in the Jackson Purchase Area.

✓ Conducting aquifer tests to enable better assessment of groundwater availability.

✓ Creating new webpages needed to enhance public access to groundwater data.

✓ Conducting targeted sub-regional groundwater-quality assessments.
Questions?

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