ADDRESSING GROUNDWATER GOALS OF THE MISSOURI REGIONAL PLANNING AREA

Kansas Water Office Contract #16-125

Progress report for Kansas Water Office

by

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Scope of Work

The scope of work of the project is intended to fulfill the data and research portions of two of the main goals of the Missouri Regional Planning Area (Missouri RPA), namely, goal 1) "Since groundwater quality is not well known, compile existing and collect additional data over the next 5 years to establish a baseline"; and goal 3) "Collect additional information to improve safe yield estimate of groundwater and tributary streams within 3 years".

The scope of work for the present project #16-125 is summarized in five items as follows:

Item no. 1. Extract data about the glacial, alluvial and bedrock aquifers in the region from online databases: Water Well Completion Records (WWC5) and Water Well Levels (WIZARD) online databases of the KGS; water use from the Water Information Management and Analysis System (WIMAS) online database of the DWR-KDA served by the KGS; Groundwater Levels and Water Quality online databases of the USGS.

Item no. 2. Obtain non-digital historical data on drilling logs (including available test-hole data), preglacial drainageways, bedrock surface topography, saturated thickness of Pleistocene deposits, and groundwater quality in the area. These data will be assembled from publications and other available sources on groundwater hydrogeology and groundwater quality for counties in the Missouri Regional Planning Area.

Item no. 3. Construct digital databases from collected existing data (available historical reports and online databases).

Item no. 4. Prepare digital maps of updated bedrock surface topography, saturated aquifer thickness, preglacial drainageways, water use, and groundwater quality from digital databases.

Item no. 5. Prepare a report assessing groundwater in storage, general sustainability, and groundwater quality conditions, and determine the greatest needs for collection of additional data, and recommendations for locations of long term monitoring sites.

The present progress report, the first of a series of three, covers items no. 1 and 2.

Study Area

The study area is the Missouri Regional Planning Area in northeast Kansas. It includes one county in full (Doniphan –DP) and six counties partially (Marshall –MS, Nemaha –NM, Brown –BR, Atchison –AT, Leavenworth –LV and Wyandotte –WY).

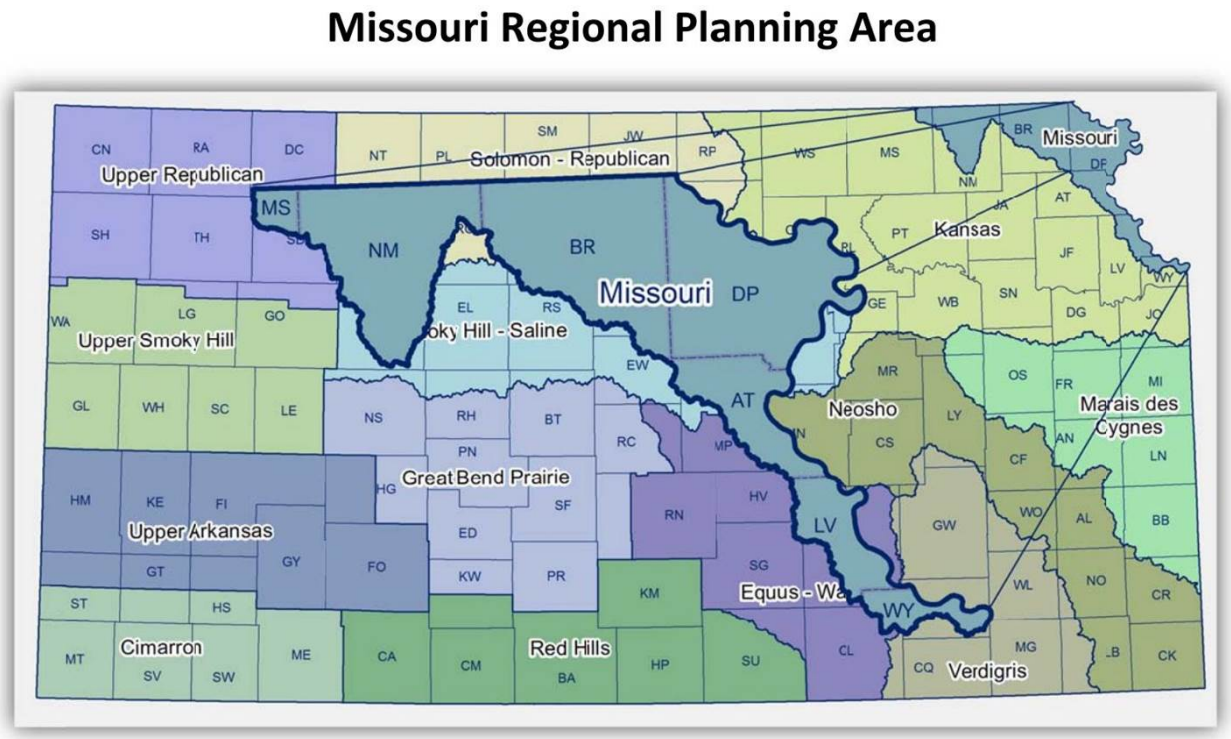

Figure 1. Location of the Missouri Regional Planning Area with its seven counties (from west to east: Marshall – MS, Nemaha –NM, Brown –BR, Doniphan –DP, Atchison –AT, Leavenworth –LV, Wyandotte –WY).

Data from the WWC5 database

The WWC5 database was filtered for the seven counties included in the study, with a total of 10,843 wells on file. The distribution of wells per county is very unequal (Table 1). For example, only 461 wells are located in Doniphan County, but as many as 4,445 wells are on file for Wyandotte County. However, not all wells are relevant for the present study, as many of them are outside the Missouri RPA. We coupled the information from the WWC5 database with ArcGIS® to select those wells that are inside the Missouri RPA, and among them, the ones that have drilling log data readily available. The percentage of wells with readily available drilling log data in the Missouri RPA varies from 17% in Marshall County, to 72% in Doniphan County.

Information about depth to bedrock and aquifer thickness has been obtained from those wells with readily available drilling log data in the WWC5. However, it is important to note that about 55% of the wells in the Missouri RPA do not have readily accessible drilling log data in an electronic form in the WWC5. That percentage is large, and not considering those wells would

affect the final results of the project. Because of that, we are now in the process of transforming the drilling log information into an electronically accessible form for those wells inside the Missouri RPA. This information, that is expected to be available in the following weeks, will reduce the uncertainty on maps of depth to bedrock and aquifer thickness that will be performed in following stages of the project.

Table 1. Summary of available wells in the Water Well Completion Records (WWC5) database.

	Wells in county	Wells in the MRPA	% wells in MRPA	MRPA wells with available log data	% wells in MRPA with log	MRPA wells without log	% MRPA wells without log
Marshall	875	6	0.7	1	16.7	5	83.3
Nemaha	883	428	48.5	241	56.3	187	43.7
Brown	999	719	72.0	464	64.5	255	35.5
Doniphan	461	457	99.1	330	72.2	127	27.8
Atchison	677	400	59.1	154	38.5	246	61.5
Leavenworth	2503	858	34.3	330	38.5	528	61.5
Wyandotte	4445	1942	43.7	491	25.3	1451	74.7

Additional data to complement WWC5

In order to complement the WWC5 database, KGS established contact with Brad Vincent of Ground Water Associates, Inc. (GWA), in November 2016 to obtain test-hole data from projects including drilling performed by GWA for cities and rural water districts in the area. Data from test-holes are not included in the WWC5 database because they are not completed wells, only test-holes as their name indicates. Nonetheless, these data can be as important as the data in the WWC5 database when it comes to preparing maps of depth to bedrock and aquifer thickness because they not only add for additional sites, but can represent locations with different lithology (often less permeable material than for completed wells). Unfortunately the drilling data corresponding to these test-holes belongs to cities and rural areas for which GWA worked, so Brad cannot release the data. Brad agreed to provide KGS with the contact information for the cities and rural water districts for which he worked in the study area. Once KGS has the contact information on the owners, a release data form will be sent to them so that the KGS can obtain information related to the geology of these test-holes from GWA.

Future steps

The following steps will be taken during the next stage of the project:

- Include available drilling logs into the WWC5 database and use them to build digital maps using ArcGIS®;
- Obtain contact information about cities and rural water districts that own test-hole data, request data release forms, request drilling log data for those supplying forms, and incorporate the test-hole log data in our files for digital mapping;

- Obtain water levels from the Water Well Levels Database WIZARD and bedrock elevation data available at the KGS in order to calculate and prepare maps of the saturated thickness of Pleistocene aquifers;
- Prepare preliminary maps using ArcGIS® to identify those areas where uncertainty is large and more information is needed, and to detect errors.