

MEMO



DATE: August 28, 2020
TO: Governor Laura Kelly
FROM: Earl Lewis, Director
RE: Arbuckle Formation Study Update

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The Arbuckle Study Group, consisting of all recommended agencies and stakeholders, continues to work towards consensus regarding a study plan that addresses fundamental data needs to characterize the Arbuckle's disposal and storage capabilities for continued long term use.

Defining Short and Long-Term Issues for the Arbuckle

Short term issues are the primary driver for the establishment of the study group. Class I injection wells in South Central Kansas are showing increasing fluid levels raising the question of the viability of continued use in the region. Class I wells are regulated by the Kansas Department of Health and Environment and dispose of a variety of fluids ranging from reverse osmosis waste to industrial process chemicals and brine. Class II wells are regulated by the Kansas Corporation Commission and dispose of brine resulting from oil and gas production. Some of the wells regulated by both agencies dispose into the Arbuckle zone, located below the Equus Beds freshwater aquifer. This overlying aquifer is a source of freshwater for several users in the Wichita region.

While potentially not part of the broader data collection and study, some of the questions that have been raised, and yet not fully answered, for these wells include:

- Whether additional maintenance or reworking of the individual wells could allow for more fluid to enter the Arbuckle without raising static fluid levels.
- Whether some of the fluid volume that is currently being disposed could be reduced by additional action or processing on the surface before injection
- Whether it is advisable to allow Class I wells to inject the fluid under pressure as allowed under the Class II well regulations
- How much of the fluid level rise is caused by individual wells themselves or, conversely, in response to increased regional fluid injection

Another short-term issue is the continued induced seismicity affecting the region. There appears to be general agreement that actions taken by the Kansas Corporation Commission to limit the amount of fluid injected per day into a single well has reduced the frequency and magnitude of the events in Harper and Sumner Counties, which was the first area of Kansas impacted by seismicity. What is not as well-known is where existing faults are located across the state. As additional fluid is injected there may be new locations where earthquakes are triggered.

Long term issues are primarily focused on the continued ability to use the formation for a variety of purposes. Continued fluid disposal is the primary, and largest economic, concern.

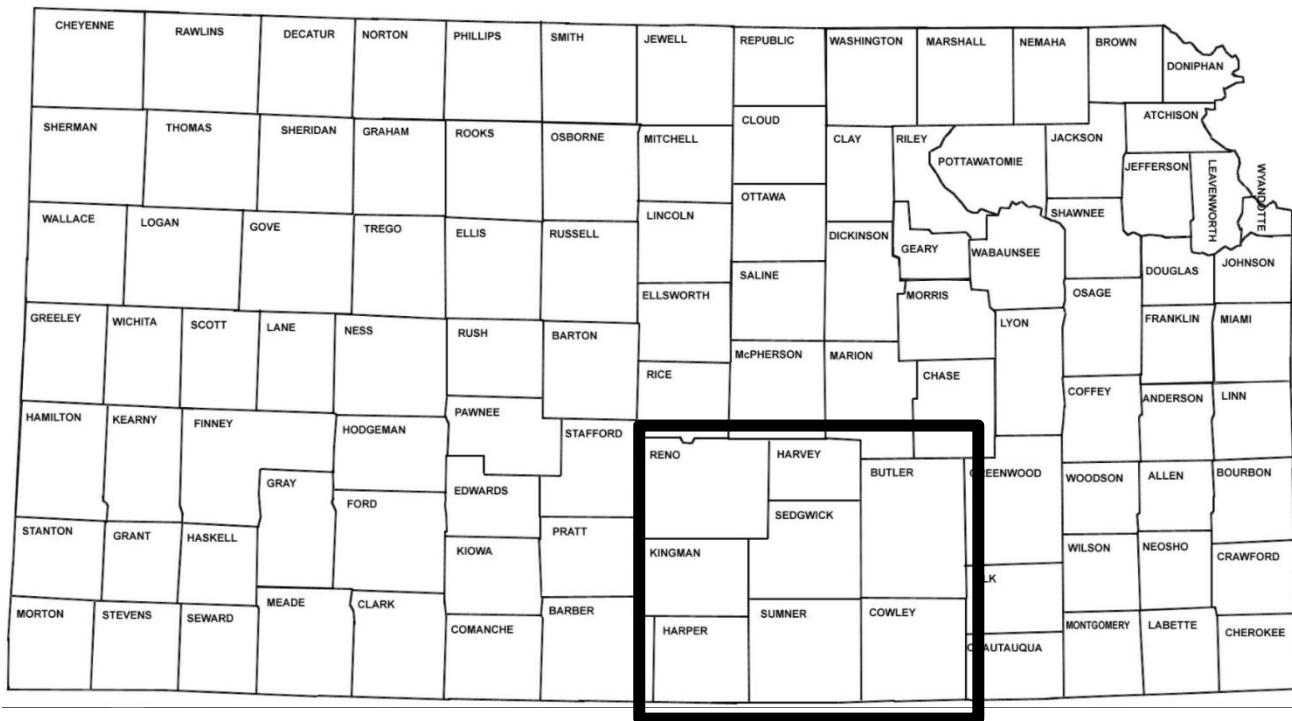
Some water suppliers in the Pittsburg area use the formation for public water supply. The water within the Arbuckle is fresh in Southeast Kansas. There is a long-term concern about eastern migration of the salinity front from the West into the freshwater supply, causing the communities to develop alternative supplies or additional treatment.

The Arbuckle also presents an opportunity for carbon dioxide sequestration. Not much is known about this issue at this time. Should a market develop for sequestration due to regulatory limits or carbon trading, we could be faced with the prospect of needing information and policy on whether to allow CO2 injection, and under what conditions. The majority of the study group believes a fundamental understanding of the Arbuckle along with questions regarding sequestration regulation need to be addressed prior to entertaining this concept.

Determining the Scope of the Study

Class I wells are regulated by KDHE while Class II wells are regulated by KCC. While there is communication and coordination between the agencies, the wells are not operated under the same regulations. This leads to different types and levels of data needed and collected. Getting better coordination of the data that are collected and making them more readily available to all stakeholders is a continuing effort. There is not unanimous agreement on what data are needed, nor what collection procedures and standards should be used.

While the Arbuckle Formation underlies a majority of the state, we do not have the funds, nor the time to tackle characterization of the entire formation. Nor is there universal agreement that it is needed. There is agreement that having additional information in the area that has the most immediate issues is warranted. The South-Central Kansas region generally shown in the box in the following map is the current area of interest for the group.



With the passage of the appropriation bill during the 2020 legislative session, \$68,000 was included within the Kansas Water Office budget for this effort. The KWO asked the Kansas Geological Survey to develop a preproposal that would provide for the use of these funds. The study group provided feedback resulting in a revised version which would begin data collection and test methods at a limited number of wells comparing methods and results from Class II and Class I wells. This work has not yet started.

It is clear that additional data collection and studies will be needed in future years to better characterize the formation and provide information to regulatory agencies. Getting that information into a centralized, publicly accessible location will be key to identifying gaps and developing better understanding.

Gain a Better Understanding of How to Manage Use of the Arbuckle

Both KCC and KDHE continue to work with their regulated community and across agency lines to discuss management of the formation. For example, KCC is requesting more data and information from Class II wells in Reno and Rooks

Counties. KDHE is working with the City of Hutchinson to eliminate its large volume of injected fluid in Reno County. Any needed management changes will be determined after additional data has been collected and alternatives evaluated and discussed with the public.

Break Down Silos between Respective Agencies and Develop Strategies for Timely Sharing of Information

Each of the agencies that are involved have been talking across boundaries and working to share data and information. The agencies remain committed to this activity, but additional work remains. For example, KDHE and KCC have agreed in concept to establish a Well and Seismic Monitor tool that works with a similar Oklahoma tool.

Next Steps

Unfortunately, the pandemic we have collectively experienced in 2020 has delayed much of the work and discussion that is needed on this topic. So, we are not yet at the point of making recommendations.

We have started to bring in outside experts to provide the study group with additional information on how the issues are being seen in other states and how they are being addressed.

We plan on putting the funding provided to use in data collection and method evaluation quickly.

We will continue to work on data sharing and refining actions we can take to address the short-term issues.

We will provide another update prior to the beginning of the 2021 legislative session.