



NEWSLETTER

First Annual AMG Field Trip, October 10-11, 1954



AMG Field Trip to St. Joseph Lead Company No.16 Shaft, Elvins, Missouri (MGS Photo Archives)

A Note from the President

After a brutal February, March has arrived in Northwest Missouri, bringing warm temperatures and plenty of sunshine. Our fall meeting and field trip were a smashing success, thanks in large part to the efforts made by The Doe Run Company and their staff for their efforts to make our field trip a success. I would be remiss if I did not give a special shout out to Alicia Ritter of The Doe Run Company for all of her hard work to coordinate the efforts of all involved. Alicia, thank you so much for your work on our behalf.

I also want to take a moment and let you know that our 2015 meeting is scheduled for October 2 and 3, in Liberty, Missouri. President-Elect Scott Kaden is working on what is sure to be an excellent field trip and meeting.

Finally, I'd like to take a few minutes to make you aware of the current state of anti-science legislation nationally and in Missouri, and to provide a call-to-action, an exhortation that we speak up with respect to legislation that will weaken science education regionally and nationally.

Since 2004, 53 bills purporting to broaden the protections of 'academic freedom' have been proposed at the state level. These bills are patterned after model legislation proposed by the Seattle-based Discovery Institute, a religious think-tank that promotes intelligent design as an alternative to evolution. The Institute laid out a 20-year plan to supplant evolution with intelligent design in its 1997 ['Wedge Document.'](#) The goal of each of these so-called academic freedom bills is designed to allow proponents to teach intelligent design, which is not science, without being held accountable for doing so. To date, Alabama leads the way with 9 attempts, followed by Oklahoma and Missouri with 8 attempts each. The content of the bills varies, but in every case the bills enshrine the teaching of pseudoscience as a suitable alternative for fact- and evidence-based treatment of evolution, the fossil record, and the age of the Earth. Some, such as Missouri HB 1472, contain language that would have allowed parents who disagree with evolution to remove their children from any school in which evolutionary theory is taught. Others, such as Missouri HB 291, would have required that any course that includes evolution must give equal time to for intelligent design in **all** public schools (K-University). Other bills include language that removes supervisory authority from administrators, thereby restricting their ability to ensure that instructors are not intentionally misleading students when discussing alleged weakness in the idea of evolution by natural selection and providing alternative explanations that cannot be falsified and are by definition, not science.

Why should geologists be concerned about these efforts?

The efforts to enshrine teaching intelligent design in the K-12 or university classroom are part of a larger organized campaign with specific political and social goals. Central among these goals is an effort to "reverse the stifling dominance of the materialist worldview, and to replace it with a science consonant with Christian and theistic convictions," according to a statement



put forth by the Discovery Institute. This statement reflects an emotional interpretation of what is right that is at odds with science. This approach, if incorporated into education at any and all levels will weaken science education throughout the United States. Successful legislation, such as that passed in Louisiana, will become the model for new legislation that incorporates ever broader interference in the scientific process.

As legislators and special interest groups successfully chip away at the integrity of evolution education they inevitably will expand this approach to include other scientific conclusions with which they disagree. Climate change, origin of life, the fossil record, cloning, stem cell therapies, and the efficacy of vaccines are just a few examples of topics that might be challenged by those who seek to manufacture controversy for religious or political gain.

What can you do?

I often encounter academic and professional geologists who throw up their hands and wonder, "What can I do?" The answer is to simply speak out. Some of us may write letters directly to our congressional representatives. Others may perform education and outreach designed to raise awareness of science and the scientific method in education. Still others may band together to form local, regional, or national organizations dedicated to raising awareness and increasing the amount and quality of science education opportunities for all citizens, be they students or retirees. The only thing that is certain is that those who seek to redefine or restrict science education are acting with energy and a sense of urgency. We **must** do the same.

Aaron W. Johnson

2015 Annual Meeting

The field trip for the 62nd annual meeting of the Association of Missouri Geologists will focus on water resources of northwest Missouri. The meeting and field trips are scheduled for October 2-3, 2015. Friday's field trip will focus on design and operation of a collector well in the Missouri River Alluvium and brief discussion on MoDNR's groundwater observation well network. Friday evening's activities will include the annual banquet and meeting, awards, and a short presentation on the construction of a Caldwell County lake to be used as a source of drinking water. The field trip on Saturday will focus on various water issues in Platte and Clay counties. Topics will include a wetland data collection site, hydrologic connection of the Platte River and local alluvial wells, a spring flowing from a glacial deposit and used as a source for bottled water, operation of a groundwater observation well, and the historic and geologic story of Excelsior Springs. Please check the [website](#) for more information.

AIPG Poster Contest

Don't forget that AIPG will be hosting a poster contest at this fall's AMG banquet! The AIPG—Missouri section will be paying banquet fees for participating students and also award tuition assistance cash prizes to the top three presenters in the amounts of \$600, \$400, and \$200 for first, second and third place respectively. Undergraduate and graduate geoscience students from all Missouri universities and colleges are welcome to participate.

Missouri Geologists' Consortium Update

The Missouri Geologists' Consortium (MGC) met in January, 2015. The MGC teamed up with the AEG St. Louis Section for a January dinner meeting in St. Louis. Also in attendance was the Director of the MDNR, the State Geologist, the Executive Director of the Missouri Board of Geologist Registration and the chair of the MGC. Each gave a short presentation. This was an excellent venue for not only geologists, but other interested professionals, academics and students to hear first-hand what is going in the state that could impact them directly or indirectly.

The MGC supported the annual Shaking Hands event in Jefferson City, where several members take a day out of their busy schedules to educate our legislators about the important work that geoscientists do, and how we can help them make informed decisions. The MGC has tracked vacancies on the Board of Geologist Registration and the Missouri Seismic Safety Commission, and distributed information on how to apply for a seat. In March, several MGC members traveled the Missouri capital to testify on behalf of Senate Bill 476, which would set up a fee structure to permit oil and gas wells in the state. The increase in construction of oil and gas wells in the last few years has outpaced the state's ability to effectively and safely permit them. This legislation would impact the state Oil and Gas Council, so this was another excellent opportunity for our group to make a positive impression and further protections for public health and safety. Lastly, the MGC continues to monitor proposed and pending legislation that could impact geologists and the practice of geology in Missouri. The next meeting will be on April 18, 2015 in Columbia at the Boone County Regional Library

Duane Kreuger



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Geology at a Glance:

Lake City Alluvial Valley

Scott Kaden, Missouri Geological Survey, Water Resources Center

The 2015 AMG annual meeting will be held in Liberty, MO featuring field trip sites in Platte, Clay, and Jackson counties. The geologic emphasis for the meeting is water resources of northwest Missouri and will include presentations and field trip stops to several sites in this region. One site that will not be discussed at the meeting is the Lake City alluvial valley. Although this feature has a unique geologic history, it will not be included in the field trip.

The Lake City alluvial valley is a 16-mile-long, 1- to 2-mile wide alluvium-filled channel that begins at the southern edge of the Missouri River floodplain in central Jackson County. The valley extends southeast to Lake City, then trends northeast and intersects again with the Missouri River alluvium in northeastern Jackson County.

In their unpublished 1948 manuscript, Anderson and Greene described a sequence of events that occurred following the close of the Tertiary Period leading to the development of the valley.

At the end of the Tertiary, the Kansas River flowed to the east and occupied the current Missouri River valley between Kansas City and Brunswick. It was at this point, near Brunswick, that the ancestral Kansas River joined the ancestral Missouri River (Figure 1).

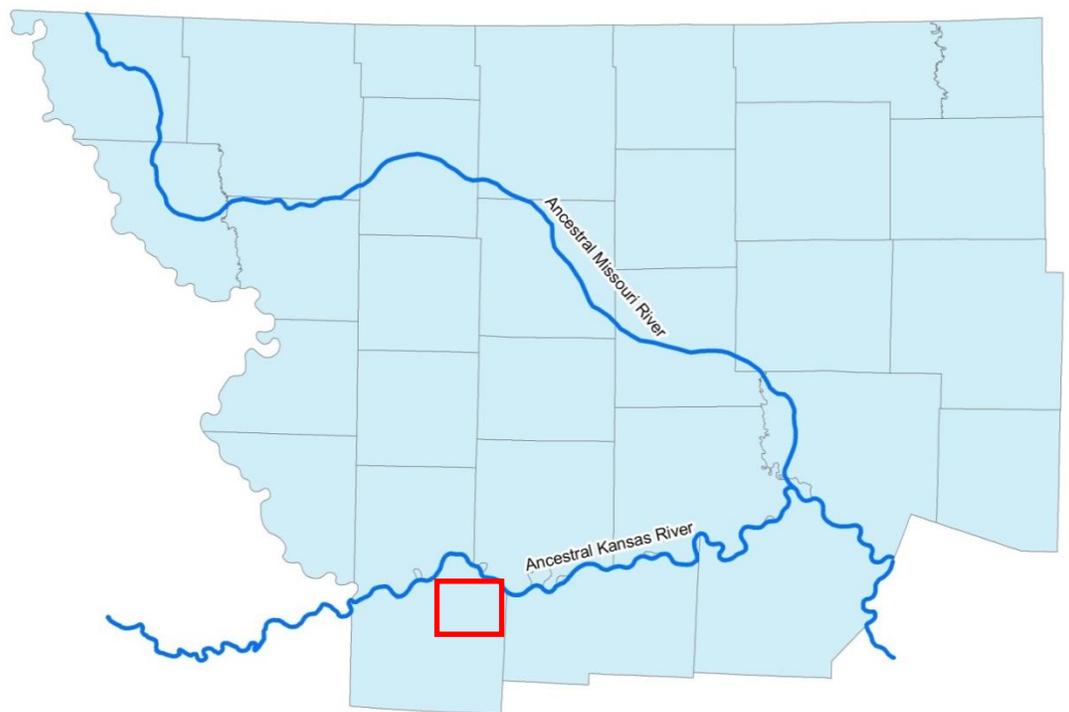
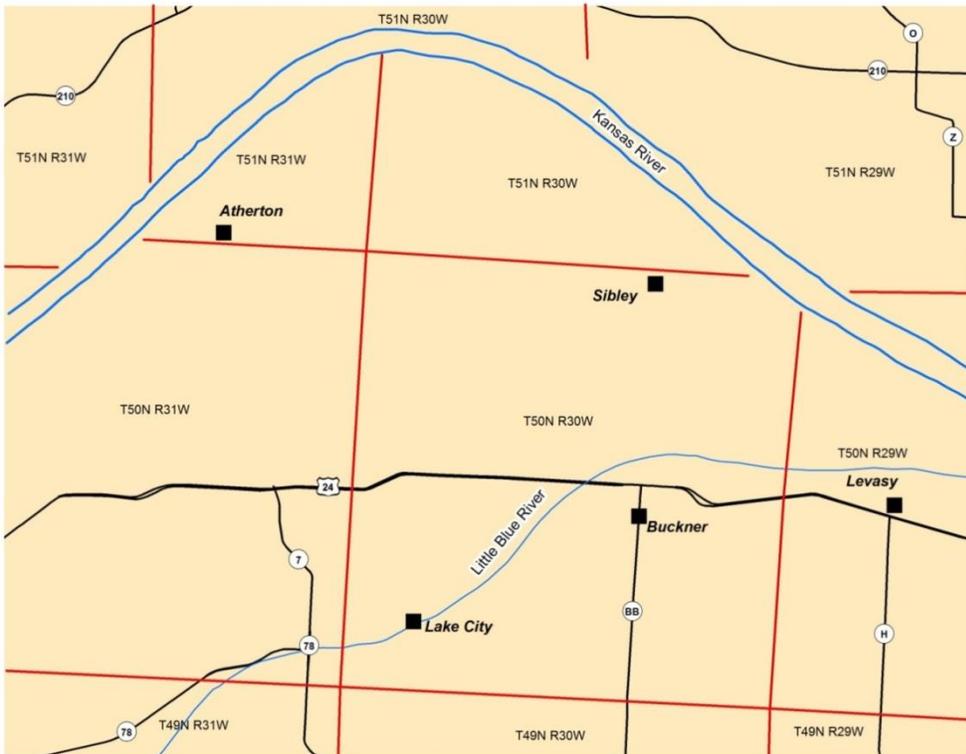


Figure 1: Locations of ancestral Missouri and Kansas rivers and of subject area



During this same time, the Little Blue River occupied its current valley to near Lake City where it then turned to the northeast and flowed toward Buckner to meet the ancestral Kansas River (Figure 2). It is believed this was the setting before any glaciation, and thus was pre-Nebraskan.

Figure 2: Pre-Nebraskan

The first stage of this valley development occurred as a result of the advancing Nebraskan Glacier. The ice blocked the Kansas River and diverted it to the south between Atherton and Sibley toward Buckner. Here the Kansas River joined the Little Blue River and flowed in the smaller stream's channel to the east toward Levasy (Figure 3).

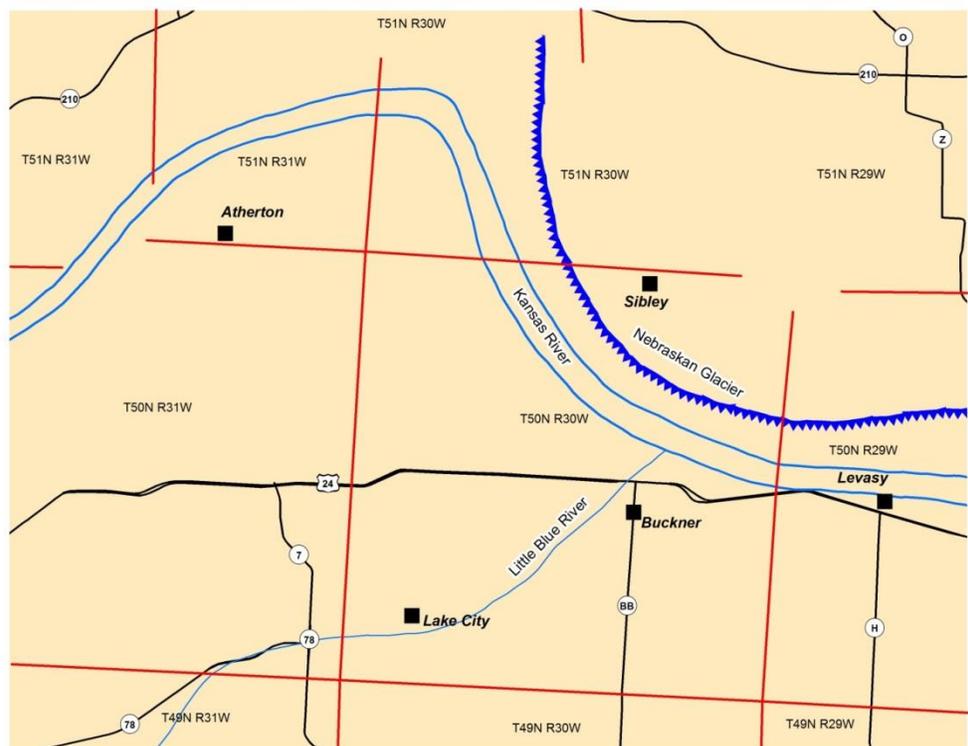
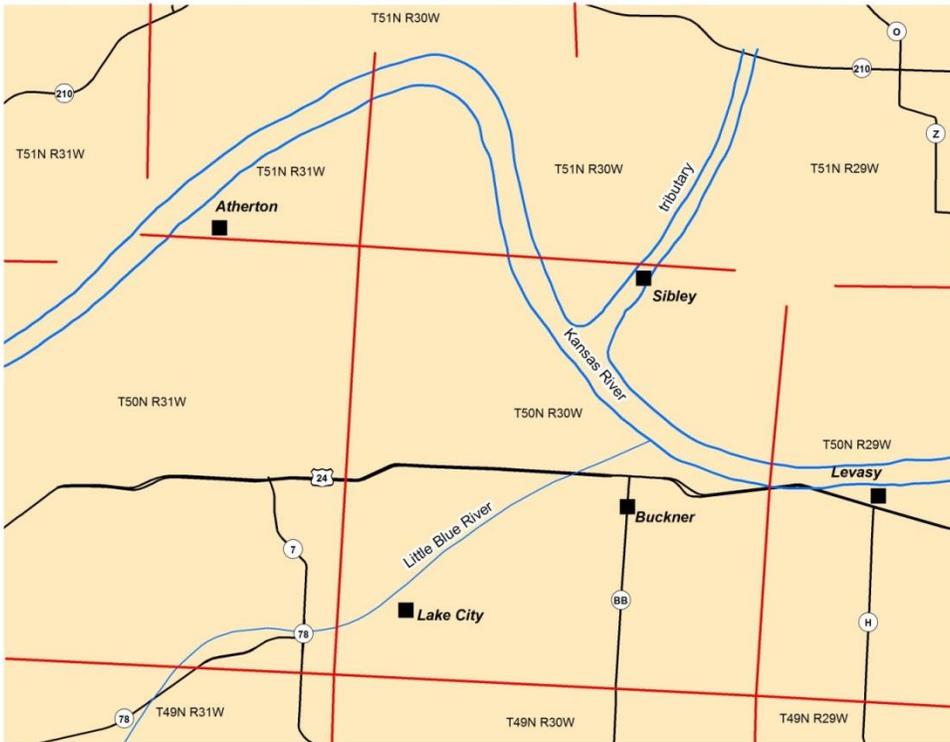


Figure 3: Nebraskan



During the Aftonian Period, following the retreat of the Nebraskan Glacier, the drainage remained virtually unchanged. The only variation was the addition of a south flowing tributary to the Kansas River carrying the glacial meltwater to the main drainage (Figure 4).

During the advancement of the Kansan Glacier, the Missouri River was diverted from its ancestral course to flow around the ice more near its current channel. As the glacier moved south, it passed through Atherton and Sibley stopping just north of Lake City, Buckner and Levassy. This caused the ancestral Missouri River to cut a new channel to the west of Atherton flowing south where it met the Little Blue River and turned east (Figure 5). During the advancement of the Kansan Glacier, the former river channels north of Buckner and east of Atherton were filled with glacial boulders and till to a depth of as much as 200 feet.

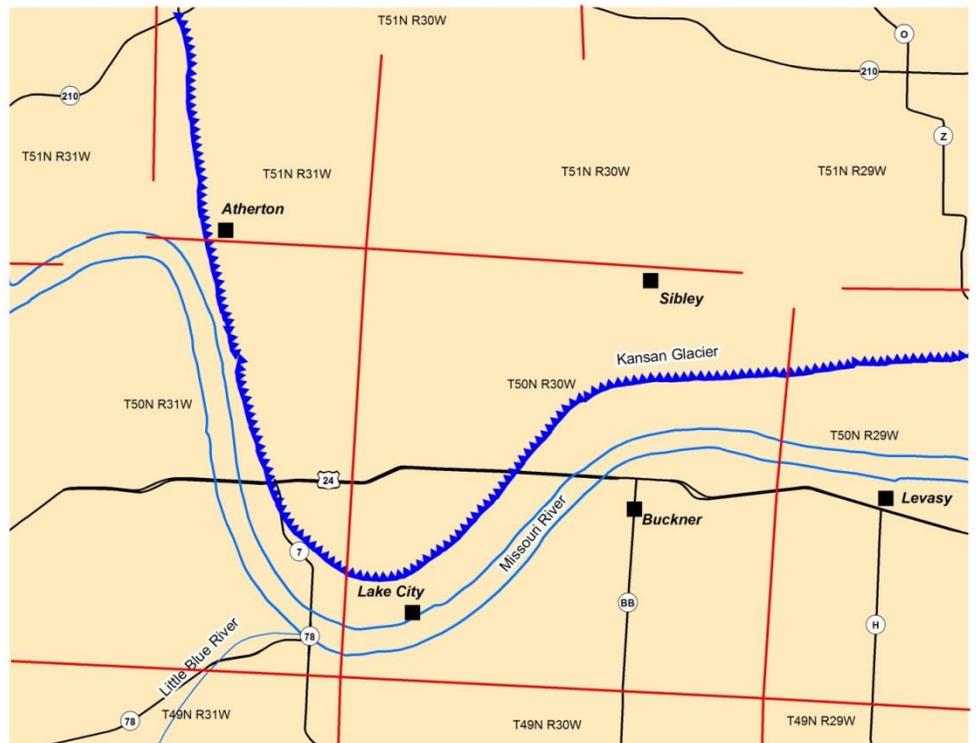
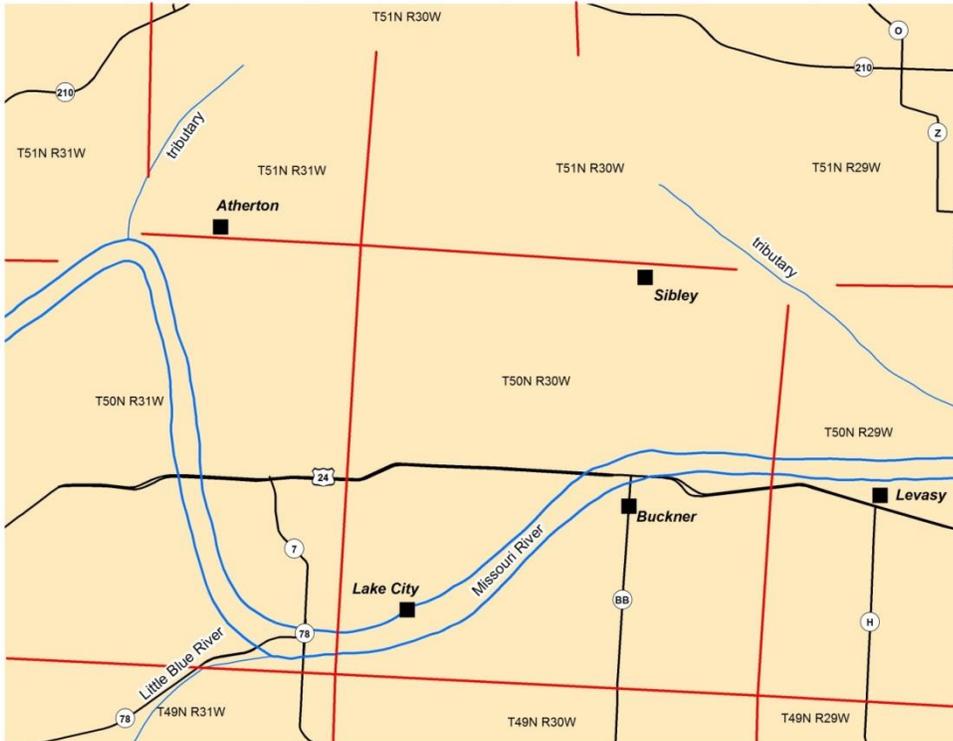


Figure 5: Kansan



As the Kansan Glacier retreated, two separate small tributaries developed. One stream flowed from just north of Atherton to the southwest and one flowed from Sibley to the east. These two tributaries began the process of excavating the till deposited by the glacier in the channel previously occupied by the Kansas River (Figure 6).

Finally, during early Wisconsin time, the two small tributaries had removed enough material from the ancestral Kansas River channel that the Missouri River abandoned its course south from Atherton and occupied the former Kansas River channel. The Little Blue River then flowed north from Lake City to join the Missouri River near Atherton and Fire Prairie Creek flowed east from Buckner toward the Missouri River occupying this portion of the former channel (Figure 7).

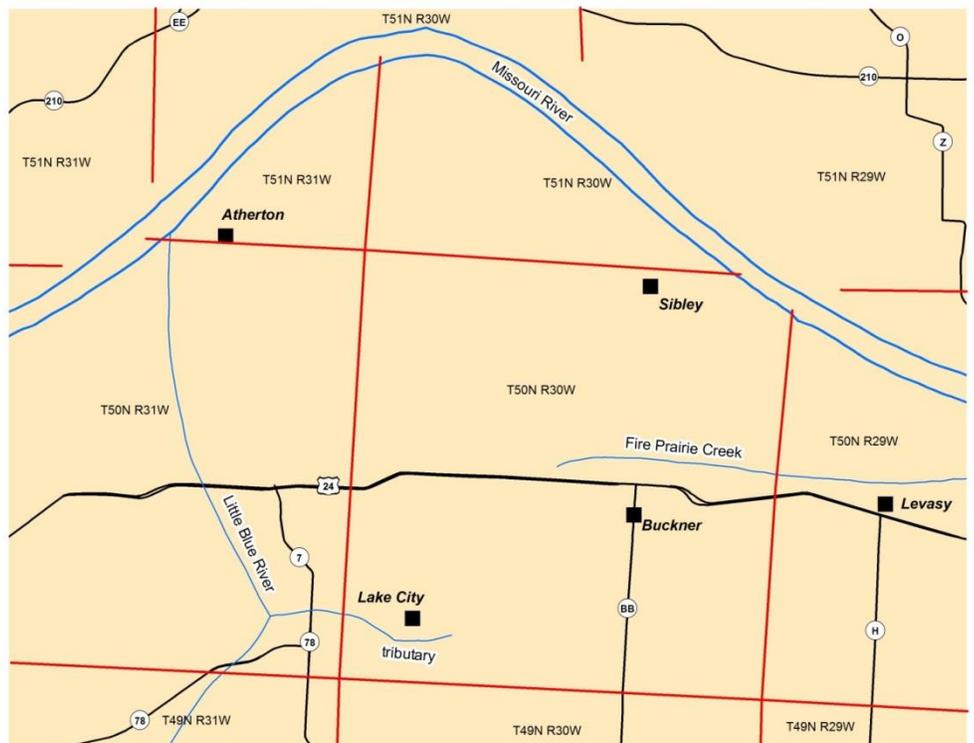


Figure 7: Wisconsin

The location of the ancestral Missouri River in northwestern Missouri was determined in the late 1950s based on an extensive drilling program conducted by the Missouri Geologic Survey and Water Resources. This study focused on the lack of groundwater resources in northwest Missouri and locating potential sources of drinking water. Logs of over 1,200 drill holes were studied to determine areas of high sand and gravel content indicating areas of former alluvial deposits and the location of the ancestral Missouri River (Figure 8).

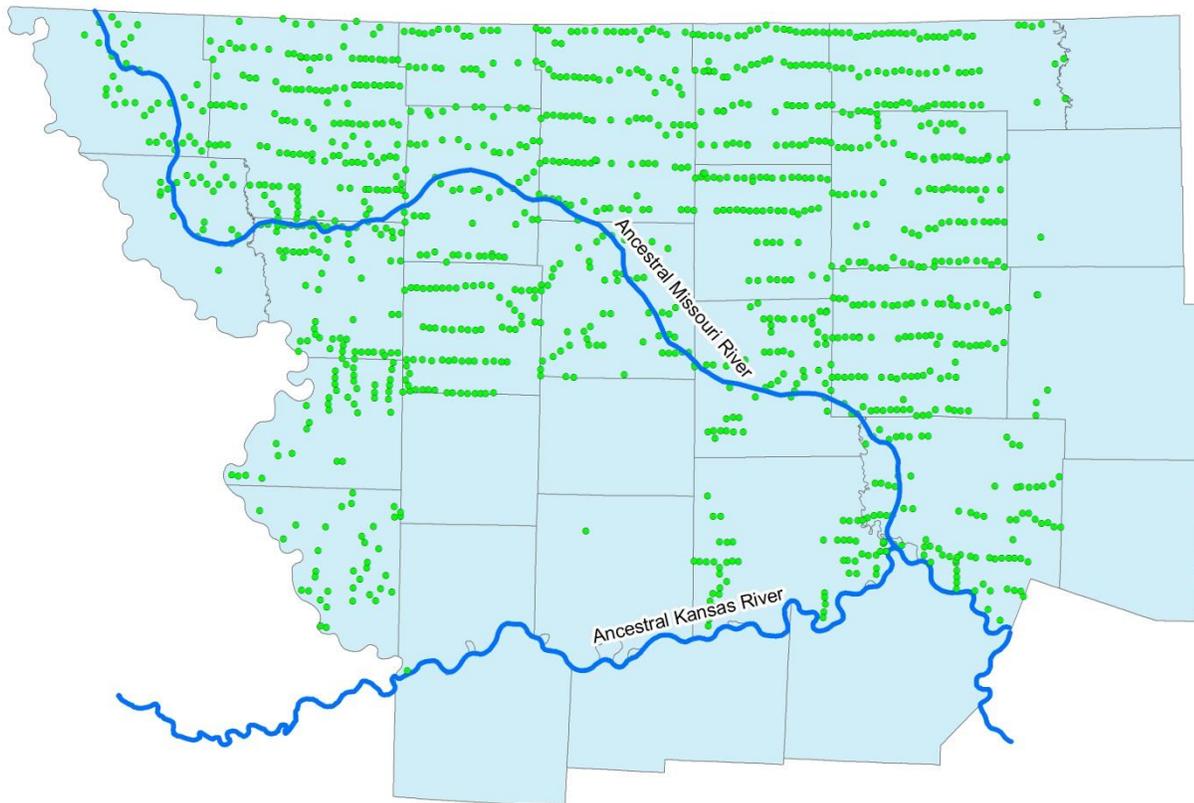
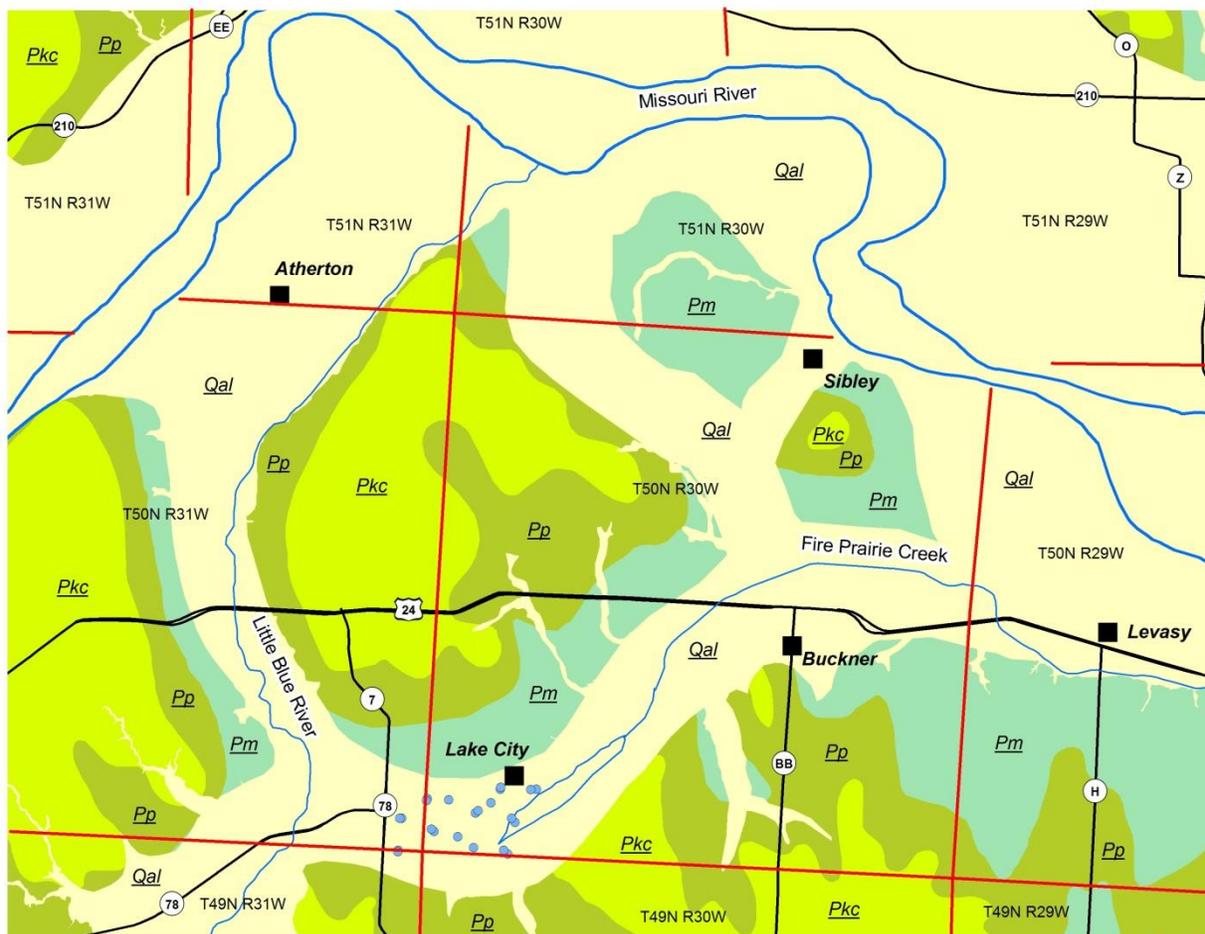


Figure 8: Northwest Missouri geologic test wells

Much of the knowledge concerning the Lake City buried channel comes from studies performed in the early 1940s when the Lake City Ordnance Plant was built in the valley overlying the buried channel. Several wells (shown in blue in Figure 9) were constructed in the buried channel to provide water for the facility. Most wells encountered 80 to 90 feet of alluvial materials, the lower part of which was coarse sand and gravel. Water levels were initially about 15 to 20 feet below land surface, and yields of wells constructed in the channel were generally 300 to 400 gallons of water per minute. Groundwater storage estimates assume an average buried valley width of 1 mile, a length of 15 miles, a saturated thickness of 60 feet, and a specific yield of 0.15. Based on this, the buried valley contains an estimated 28.2 billion gallons.

The ordnance plant is a 3,935 acre government owned, contractor operated plant that began operation in 1941. It is the largest small arms ammunition plant in the nation. Industrial operations generated large quantities of potentially hazardous waste, including solvents; explosives; heavy metals such as barium, cadmium, chromium, lead, mercury and silver; and depleted uranium. Since 1941, the facility disposed of operational wastes in lagoons, landfills and burn pits located throughout the six-square-mile facility which lead to contamination of groundwater, surface water and soil. Current disposal practices are in accordance with state and federal regulations. Contaminants associated with a groundwater plume in the northeast corner had previously migrated past the facility's boundary but are currently hydraulically contained onsite by a groundwater pump and treat system (Missouri Department of Natural Resources, 2014).



References Cited

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