PRELIMINARY SURFICIAL GEOLOGY OF THE ARGONIA QUADRANGLE, HARPER AND SUMNER COUNTIES, KANSAS

by Jon J. Smith and John W. Dunham

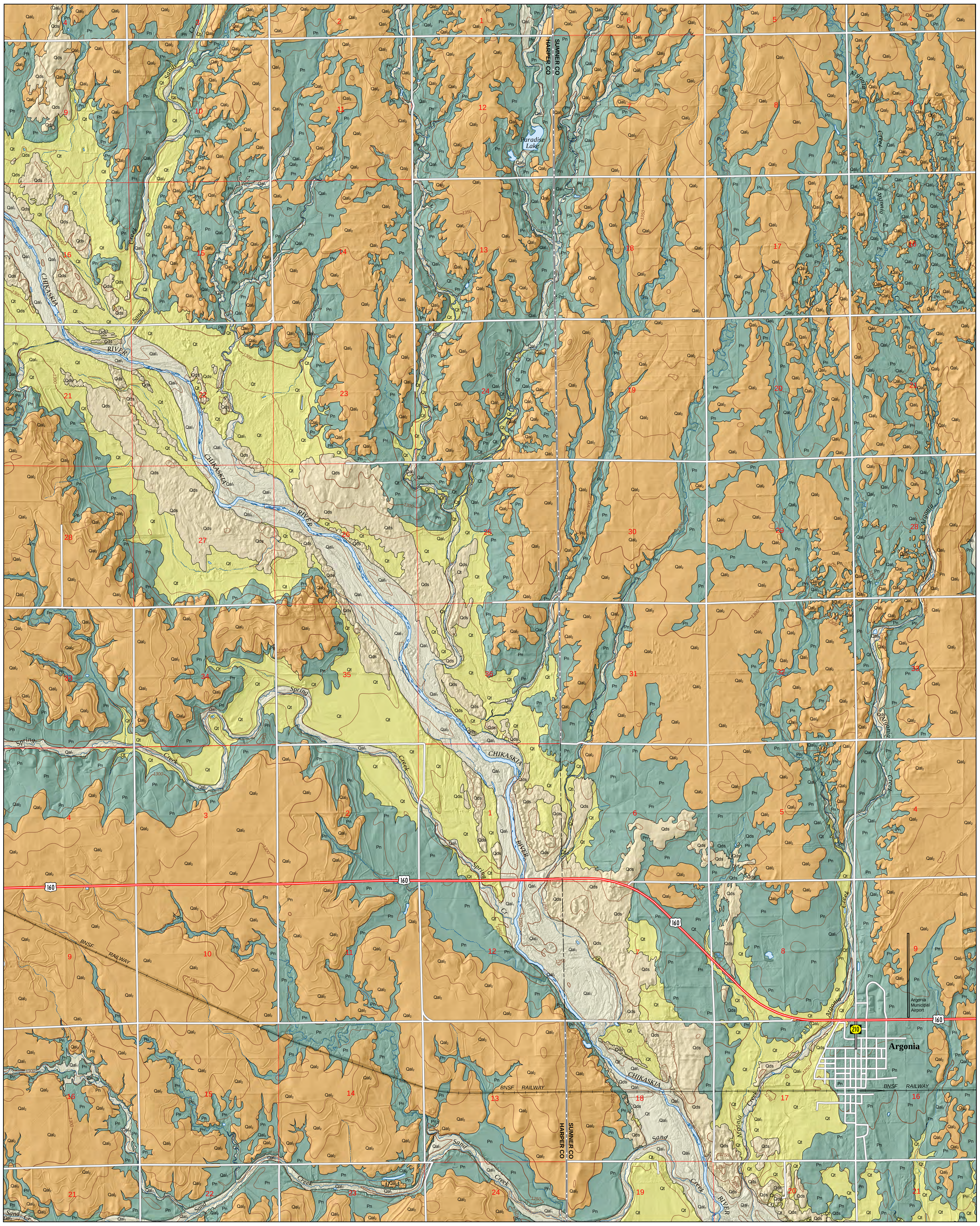
2019

Cartographic assistance by Atefeh Hosseini

KU KANSAS GEOLOGICAL SURVEY
The University of Kansas

Open-File Report 2019-13

Funded in part by the USGS National Cooperative Geologic Mapping Program



The following descriptions consist of a compilation of several sources, including field notes and measured sections, data from shallow (<10 m) cores collected during the course of mapping, U.S. Department of Agriculture Natural Resources Conservation Service databases, and lithologic and other data in Swineford (1955) and Walters (1961).

GEOLOGIC UNITS

CENOZOIC

Quaternary System
Pleistocene-Holocene

Qal_1

Undifferentiated floodplain alluvium — These alluvial deposits make up the modern floodplain in most of the principal streams in Harper and Sumner counties. The main stems of streams in the county underwent deep incision during the latest Holocene and have recently re-established floodplains within the incised channels in some areas. Floodplain alluvium is composed of silt, sand, and gravel and is relatively thin, probably not exceeding 20 ft (6 m) in thickness.

Qt

Alluvial terrace deposits — Terrace deposits, generally found adjacent to and slightly above stream floodplains in Harper and Sumner counties, are numerous along Bluff Creek, Big Sandy Creek, and the Chikaskia River and its tributaries. These deposits are composed of clay, silt, sand, and gravel and likely do not exceed 50 ft (15 m) in thickness.

Qal_2

Upland alluvium — Upland alluvial deposits are mostly confined to the eastern portion of Harper County but are extensive in Sumner County, well above and often distant from stream floodplains. Composed chiefly of Pleistocene silt, sand, and gravel, these deposits are reddish brown in color and contain rocks with various provenances, including considerable material derived locally. Upland alluvium ranges from 0 to perhaps 50 ft (15 m) in thickness.

Qds

Dune sand — The most extensive deposits of windblown sands in Harper County are adjacent to Big Sandy Creek in the western part of the county. A smaller dune field is located on the east side of Bluff Creek northwest of Anthony. Smaller, scattered dune fields occur along Bluff Creek and the Chikaskia River and tributaries. In Sumner County, dune sands are associated with major streams (e.g., the Arkansas and Chikaskia rivers) which provide the source for the windblown deposits. Dune-sand deposits create a hillocky terrain and are stabilized for the most part by vegetation. Dune sand is generally less than 30 ft (9 m) thick in most areas, though it may reach 50 ft (15 m) thick in the area of Big Sandy Creek.

PALEOZOIC

Permian System
Leonardian Series

Pn

Ninnescah Shale — The Ninnescah Shale of the Permian Sumner Group is composed mostly of blocky brownish-red dolomitic or calcareous silty shale but also contains some gray shale, argillaceous limestone and dolomite, and calcareous siltstone. The different colors of the beds give the outcrops a banded appearance. The unit's maximum thickness is 450 ft (137 m), but probably only the upper 250 ft (75 m) crops out in Sumner County and about 100 ft (30.5 m) in eastern Harper County. The Ninnescah Shale is marked at the top by the Runnymede Sandstone Member, an approximately 8 ft (2.5 m) thick, very fine-grained, gray to grayish-green siltstone and sandstone. North of Harper and Sumner counties, the upper limit of the Ninnescah Shale is demarcated at the base of the Stone Corral Formation, but in Harper and Sumner the Stone Corral is absent. The Ninnescah is the oldest rock unit exposed in Harper County.

CITED REFERENCES

Swineford, A., 1955, Petrography of Upper Permian rocks in south-central Kansas. Kansas Geological Survey, Bulletin 111, 179 p.

Walters, K. L., 1961, Geology and ground-water resources of Sumner County, Kansas. Kansas Geological Survey, Bulletin 151, 198 p.

ADDITIONAL SOURCES

Bayne, C. K., 1960, Geology and ground-water resources of Harper County, Kansas: Kansas Geological Survey, Bulletin 143, 183 p.

McCauley, J. R., 2007, Geologic map of Barber County, Kansas: Kansas Geological Survey, Map M-106, 1 sheet, scale 1:50,000.

Zeller, D. E., ed., 1968, The stratigraphic succession in Kansas: Kansas Geological Survey, Bulletin 189, 81 p., http://www.kgs.ku.edu/Publications/Bulletins/189/index.html.

EXPLANATION

Boundaries and Locations

- County boundary
- Township/range line
- Section line

Transportation

- 160 U.S. highway
- 210 State highway
- Local road
- Railroad
- Airport runway

Geologic Unit Boundaries

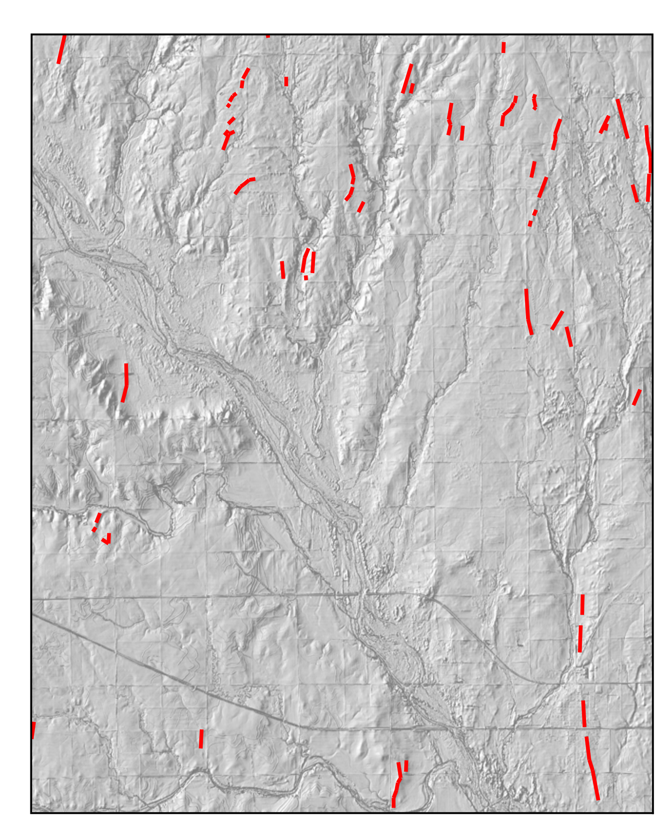
- Observed contact

Hydrology

- Perennial stream
- Intermittent stream
- Water body

Topography

- 1300 Elevation contour (50-foot interval)
- Elevation contour (10-foot interval)
- 1300 Depression contour (50-foot interval)
- Depression contour (10-foot interval)



Inset showing mapped lineaments as potential surface expressions of structural features (e.g., faults, folds, joints, ridges). South-central Kansas, like other parts of the central and eastern United States, resides in a region of relatively low historical and instrumentally recorded seismicity. Despite this, the state has experienced approximately 3,500 earthquakes since 2013, with more than 130 of the events recorded as magnitude 3.0 or greater. This recent spate of seismicity raises concerns about the potential risk that structural features (faults, folds, joints, and ridges) may pose for moderate to large earthquakes. Investigations into the size or extent of these faults include mapping previously unrecognized surface features, such as lineaments, that may reflect more deeply seated structural features.

Lineaments were mapped using aerial photography and bare-earth LiDAR Digital Elevation Models (DEMs), based on one or more of the following criteria: (1) Visible offset in marker beds; (2) relatively low- to high-relief linear ridges that are not obvious geomorphic features due to erosion, slumping, subsidence, or dune formation; (3) linear ridges that cross drainage divides; (4) ridges that display curvilinear or backstepping (en echelon) configurations; (5) rectilinear or parallel drainage patterns; and (6) linear drainage patterns that align across drainage divides.

Elevation contours are presented for general reference. Used in the U.S. Geological Survey's current US Topo 1:24,000-scale topographic map series, they were generated from hydrographically improved 1/3 arc-second National Elevation Dataset (NED) data and smoothed during processing for use at 1:24,000 scale. In some places, the contours may be more generalized than the base data used for compilation of geologic outcrop patterns. Outcrop patterns on the map will typically reflect topographic variation more accurately than the associated contour lines. Repeated fluctuation of an outcrop line across a contour line should be interpreted as an indication that the mapped rock unit is maintaining a relatively constant elevation along a generalized contour.

1-meter LiDAR hillshades (2010 imagery), 1-meter U.S. Department of Agriculture – Farm Services Agency (USDA-FSA) National Agriculture Imagery Program (NAIP) digital imagery (2015 imagery), and 1-foot Kansas NG911 digital imagery were used as references in the digital mapping. USDA Natural Resources Conservation Service (NRCS) SSURGO data and other geologic maps and bulletins were used to supplement the mapping. Field mapping was undertaken from September 2018 to May 2019. Roads and highways are shown on the base map as represented by data from the U.S. Census Bureau. U.S. Department of Agriculture – Farm Services Agency (USDA-FSA) National Agriculture Imagery Program (NAIP) imagery also was used to check road locations.

Shaded relief is based on 1-meter hydroflattened bare-earth DEMs from the State of Kansas LiDAR Database. The DEM images, in ERDAS IMAGINE format, were mosaicked into a single output DEM, downsampled to 2-meter resolution, and reprojected to decimal degrees. The output DEM was then converted to a hillshade, a multidirectional shaded-relief image using angles of illumination from 0°, 225°, 270°, and 315° azimuths, each 45° above the horizon, with a 4x vertical exaggeration.

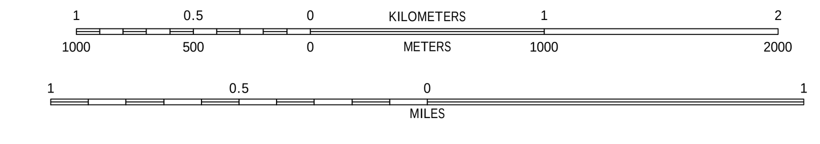
This geologic map was funded in part by the USGS National Cooperative Geologic Mapping Program, award number G18AC00197 (FY2018).

This map was produced using the ArcGIS system developed by Esri (Environmental Systems Research Institute, Inc.).

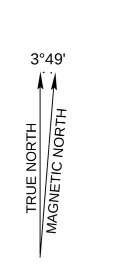
SUGGESTED REFERENCE TO THE MAP

Smith, J. J., and Dunham, J. W., 2019, Preliminary surficial geology of the Argonia quadrangle, Harper and Sumner counties, Kansas: Kansas Geological Survey, Open-File Report 2019-13, scale 1:24,000, unpublished.

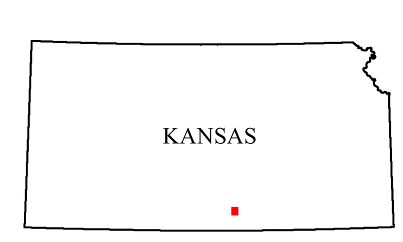
SCALE 1:24 000



UNIVERSAL TRANSVERSE MERCATOR PROJECTION, ZONE 14
NORTH AMERICAN DATUM OF 1983



APPROXIMATE MEAN DECLINATION, 2019



QUADRANGLE LOCATION

Adams	Norwich	Conway Springs
Danville	Argonia	Milan
Bluff City NW	Freeport	Caldwell NW

ADJOINING 7.5' QUADRANGLES