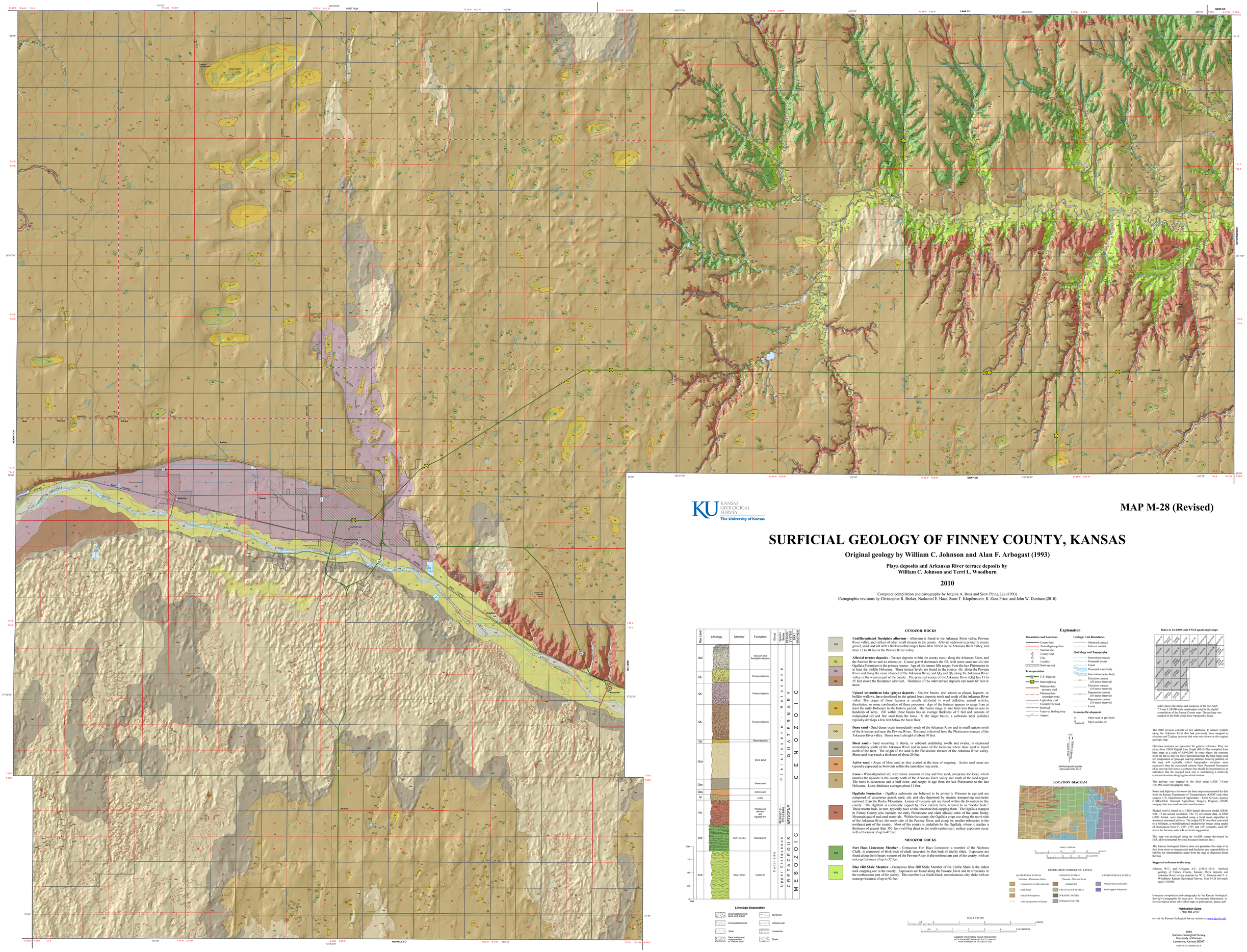

KANSAS GEOLOGICAL SURVEY
The University of Kansas

MAP M-28 (Revised)

SURFICIAL GEOLOGY OF FINNEY COUNTY, KANSAS

Original geology by William C. Johnson and Alan F. Arbogast (1993)

Playa deposits and Arkansas River terrace deposits by
William C. Johnson and Terri L. Woodburn

2010

Computer compilation and cartography by Jorgina A. Ross and Siew Phing Lee (1993)
Cartographic revisions by Christopher R. Bieker, Nathaniel E. Haas, Scott T. Klopfenstein, R. Zane Price, and John W. Dunham (2010)

Lithologic Explanation

- Unconsolidated silt, sand, and gravel
- Unconsolidated silt
- Sand
- Sand and gravel, commonly called "Rocky Ford Gravel"
- Bentonite
- Volcanic ash
- Limestone
- Shale

CENOZOIC ROCKS

Undifferentiated floodplain alluvium - Alluvium is found in the Arkansas River valley, Pawnee River valley, and valleys of other small streams in the county. Alluvial sediment is primarily coarse gravel, sand, and silt with a thickness that ranges from 30 to 50 feet in the Arkansas River valley, and from 12 to 30 feet in the Pawnee River valley.

Alluvial terrace deposits - Terrace deposits within the county occur along the Arkansas River, and the Pawnee River and its tributaries. Coarse gravel dominates the fill, with some sand and silt; the Ogallala Formation is the primary source. Age of the terrace fills ranges from the late Pleistocene to at least the middle Holocene. Three terrace levels are found in the county: Qt_1 along the Pawnee River and along the main channel of the Arkansas River, and Qt_2 and Qt_3 along the Arkansas River valley in the western part of the county. The principal terrace of the Arkansas River (Qt_2) lies 15 to 25 feet above the floodplain alluvium. Thickness of the older terrace deposits can reach 68 feet or more.

Upland intermittent lake (playa) deposits - Shallow basins, also known as playas, lagoons, or buffalo wallows, have developed in the upland loess deposits north and south of the Arkansas River valley. The origin of these features is usually attributed to wind deflation, animal activity, dissolution, or some combination of these processes. Age of the features appears to range from at least the early Holocene to the historic period. The basins range in size from less than an acre to hundreds of acres. Fill within these basins has an average thickness of 5 feet and consists of redeposited silt and fine sand from the loess. In the larger basins, a carbonate layer (caliche) typically develops a few feet below the basin floor.

Dune sand - Sand dunes occur immediately south of the Arkansas River and in small regions north of the Arkansas and near the Pawnee River. The sand is derived from the Pleistocene terraces of the Arkansas River valley. Dunes reach a height of about 70 feet.

Sheet sand - Sand occurring in sheets, or subdued undulating swells and swales, is expressed immediately south of the Arkansas River and in some of the locations where dune sand is found north of the river. The origin of the sand is the Pleistocene terraces of the Arkansas River valley. Sheet sand may reach a thickness of about 20 feet.

Active sand - Areas of blow sand as they existed at the time of mapping. Active sand areas are typically expressed as blowouts within the sand dune map units.

Loess - Wind-deposited silt, with minor amounts of clay and fine sand, comprises the loess, which mantles the uplands in the county north of the Arkansas River valley and south of the sand region. The loess is calcareous and a buff color, and ranges in age from the late Pleistocene to the late Holocene. Loess thickness averages about 11 feet.

Ogallala Formation - Ogallala sediments are believed to be primarily Miocene in age and are composed of calcareous gravel, sand, silt, and clay deposited by streams transporting sediments eastward from the Rocky Mountains. Lenses of volcanic ash are found within the formation in this county. The Ogallala is commonly capped by thick caliche beds, referred to as "mortar beds." These mortar beds, in turn, typically have a thin limestone bed capping them. The Ogallala mapped in Finney County also includes the early Pleistocene and older alluvial units of the same Rocky Mountain gravel and sand materials. Within the county, the Ogallala crops out along the north side of the Arkansas River, the south side of the Pawnee River, and along the smaller tributaries in the northeast part of the county. Most of the county is underlain by the Ogallala, where it reaches a thickness of greater than 550 feet (well-log data) in the south-central part; surface exposures occur with a thickness of up to 47 feet.

MESOZOIC ROCKS

Fort Hays Limestone Member - Cretaceous Fort Hays Limestone, a member of the Niobrara Chalk, is composed of thick beds of chalk separated by thin beds of chalky shale. Exposures are found along the tributary streams of the Pawnee River in the northeastern part of the county, with an outcrop thickness of up to 52 feet.

Blue Hill Shale Member - Cretaceous Blue Hill Shale Member of the Carlile Shale is the oldest rock cropping out in the county. Exposures are found along the Pawnee River and its tributaries in the northeastern part of the county. This member is a bluish-black, noncalcareous clay shale with an outcrop thickness of up to 92 feet.

Explanation

Boundaries and Locations
- County line
- Township/range line
- Section line
- County seat
- City
- Locality
- Bull's-eye area

Transportation
- U.S. highway
- State highway
- Medium-duty primary road
- Medium-duty secondary road
- Light-duty road
- Unimproved road
- Railroad
- Unpaved landing strip
- Airport

Geologic Unit Boundaries
- Observed contact
- Inferred contact

Hydrology and Topography
- Intermittent stream
- Perennial stream
- Canal
- Perennial water body
- Intermittent water body
- Elevation contour (50-meter interval)
- Elevation contour (10-meter interval)
- Depression contour (50-meter interval)
- Depression contour (10-meter interval)
- Levee

Resource Development
- Open sand or gravel pit
- Open caliche pit

APPROXIMATE MEAN DECLINATION, 2010

LOCATION DIAGRAM

SCALE 1:10 000 000

GENERALIZED GEOLOGY OF KANSAS

QUATERNARY SYSTEM
Holocene - Pleistocene Series
- Loess and river-valley deposits
- Sand dunes
- Glacial-drift deposits
- Limit of glaciation in Kansas

NEOGENE SYSTEM
Pliocene - Miocene Series
- Ogallala Fm

CRETACEOUS SYSTEM

JURASSIC SYSTEM

PERMIAN SYSTEM

CARBONIFEROUS SYSTEM
- Pennsylvanian Subsystem
- Mississippian Subsystem

SCALE 1:50 000

1 0.5 0 1 2 3 4 MILES
1 0.5 0 1 2 3 4 KILOMETERS

LAMBERT CONFORMAL CONIC PROJECTION
WITH STANDARD PARALLELS 33° AND 45°
NORTH AMERICAN DATUM OF 1927

Index to 1:24,000-scale USGS quadrangle maps

Index shows the names and locations of the 36 USGS 7.5-min 1:24,000-scale quadrangles used in the digital compilation of the Finney County map. The geology was mapped in the field using these topographic maps.

The 2010 revision consists of two additions: 1) terrace systems along the Arkansas River that had previously been mapped as alluvium and 2) playa deposits that were not shown on the original geologic map.

Elevation contours are presented for general reference. They are taken from USGS Digital Line Graph (DLG) files compiled from base maps at a scale of 1:100,000. In some places the contours from the DLGs may be more generalized than the base maps 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.

The geology was mapped in the field using USGS 7.5-min 1:24,000-scale topographic maps.

Roads and highways shown on the base map as represented by data from the Kansas Department of Transportation (KDOT) and other sources. 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 a USGS digital elevation model (DEM) with 1/3 arc-second resolution. The 1/3 arc-second data, in ESRI GRID format, were smoothed using a focal mean algorithm to minimize unwanted artifacts. 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 map was produced using the ArcGIS system developed by ESRI (Environmental Systems Research Institute, Inc.).

The Kansas Geological Survey does not guarantee this map to be free from errors or inaccuracies and disclaims any responsibility or liability for interpretations made from the map or decisions based thereon.

Suggested reference to this map

Johnson, W.C., and Arbogast, A.F., [1993] 2010. Surficial geology of Finney County, Kansas; Playa deposits and Arkansas River terrace deposits by W. C. Johnson and T. L. Woodburn: Kansas Geological Survey, Map M-28 (revised), scale 1:50,000.

Computer compilation and cartography by the Kansas Geological Survey's Cartographic Services unit. For purchase information, or for information about other KGS maps or publications, please call

Publication Sales
(785) 864-2157

or visit the Kansas Geological Survey website at www.kgs.ku.edu

2010
Kansas Geological Survey
University of Kansas
Lawrence, Kansas 66047
ISBN# 978-1-58806-820-X

Last updated 10/29/2014