

PRELIMINARY SURFICIAL GEOLOGY OF THE ATCHISON WEST QUADRANGLE, ATCHISON COUNTY, KANSAS

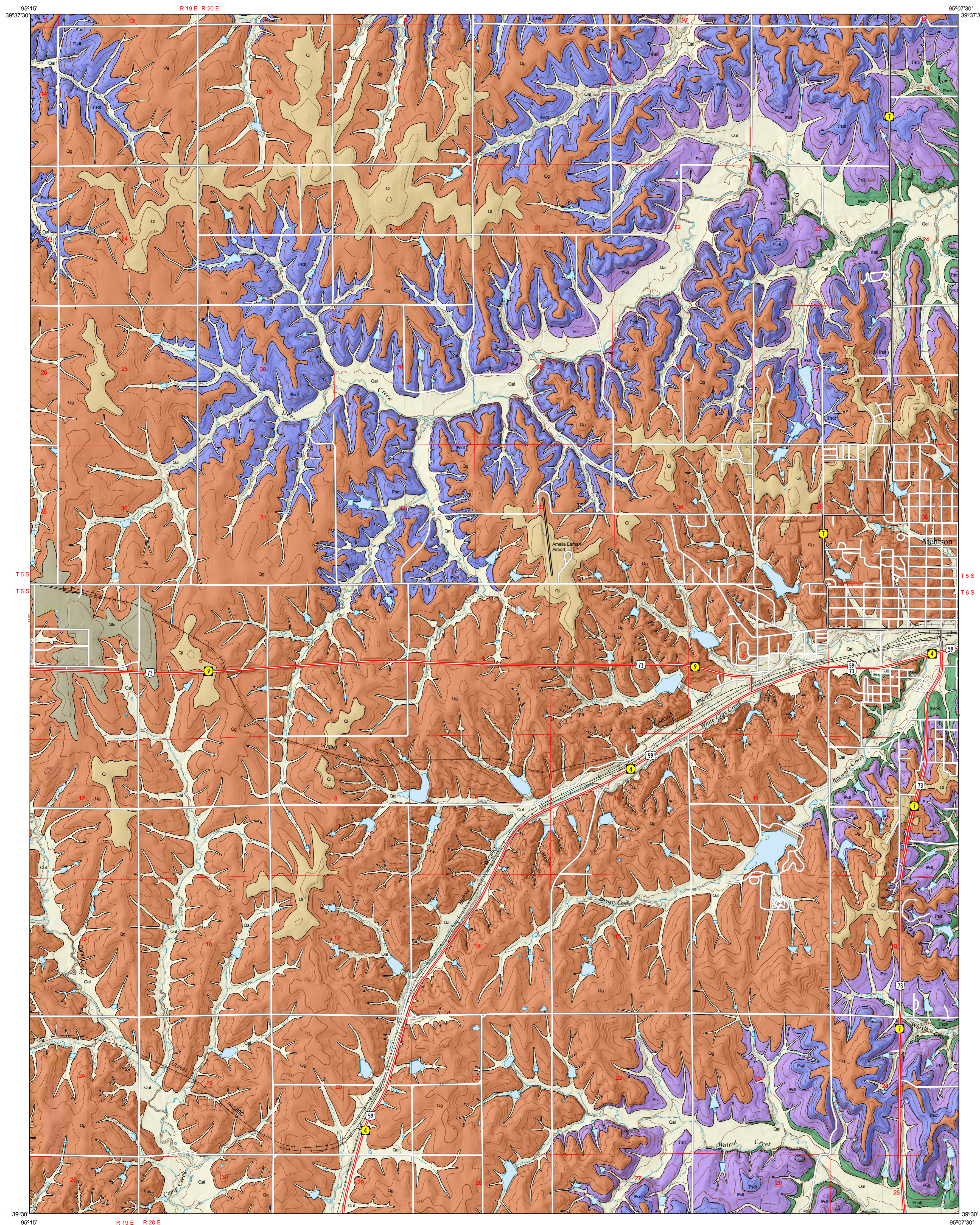
Geology by Aaron N. Koop and William C. Johnson

2014

Computer compilation and cartography by John W. Dunham, Charity M. Phillips-Lander, Hillary C. Crabb, and Dustin A. Fross

Open-file Report 2014-5

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- GEOLOGIC UNITS**
Units and descriptions from Ward (1973) and field notes
- CENOZOIC**
- Quaternary System**
Pleistocene-Holocene
- Alluvium and Terraces**—Pleistocene terraces are composed of discontinuous deposits of brown sandy clay on stream-valley walls. They may also contain reddish-brown silt resembling loess. The thickness of terraces ranges from 0.70 feet (~0.21 m). Holocene alluvium is composed of brown to bluish-gray, sandy, pebbly clay. Thin beds of gravel composed of limestone, chert, and glacial material may be interspersed throughout the alluvium or rest directly on bedrock. Alluvium may also contain reddish-brown silt resembling loess. The thickness of alluvium ranges from 0-105 feet (~0-32 m).
- Pleistocene**
- Loess**—Aeolian deposits of brown to reddish-brown, non-calcareous, slightly sandy silt are generally found in upland positions. Locally, this loess is associated with Illinoian and Wisconsin glaciations. The thickness of loess ranges from 0-40 feet (~0-12 m).
- Loess and Nortonville Clay**—The Nortonville clay is a light-gray, compact clay that may be slightly sandy and contain sparse pebbles. The Nortonville clay is lacustrine in origin and thought to have been deposited in a lake marginal to glaciers to the north. Reddish-brown weathered streaks may be present throughout the clay and additions of brown to reddish-brown, non-calcareous, slightly sandy loess have been incorporated into these upland deposits. The thickness of loess and Nortonville clay ranges from 0-45 feet (~0-14 m).
- Glacial Till**—The Cedar Bluffs till is a heterogeneous mixture of clay, silt, and gravel with colors of brown to reddish-brown, yellowish-brown, or light gray. It also contains erratics and lenses of gravel. Thickness of the Cedar Bluffs till ranges from 0-100 feet (~0-30 m). The Nickerson till is composed of a heterogeneous mixture of clay, silt, sand, and gravel with colors of dark-gray to bluish-gray with some reddish-brown streaks. It contains lenses of gravel and fewer erratics than the Cedar Bluffs till. Thickness of the Nickerson till ranges from 0-90 feet (~0-27 m).
- PALEOZOIC**
- Carboniferous System – Pennsylvanian Subsystem**
- Shawnee Group**
- Deer Creek Limestone, Calhoun Shale, and Topoka Limestone**—From the base to the uppermost part of the Deer Creek Limestone members include the Ozawie Limestone Member, Oskaloosa Shale Member, Rock Bluff Limestone Member, Larsh and Burroak Shale Member, and the Ervine Limestone Member. The Deer Creek Limestone consists of alternating beds of gray to white weathering to brown, fossiliferous, dense, and hard limestone members and gray to black, blocky to fissile, and clayey to silty shale members. The Ozawie and Rock Bluff Limestone Members are single-bedded to massive. Thickness of the Deer Creek Limestone ranges from 3040 feet (~9-12 m). The Calhoun Shale is a bluish-gray, platy to blocky, silty, sandy shale. Its thickness ranges from 15-25 feet (~4-8 m). From the base to the uppermost part of the Topoka Limestone members include the Harford Limestone Member, Iowa Point Shale Member, Curzon Limestone Member, Jones Point Shale Member, Sheldon Limestone Member, Turner Creek Shale Member, Du Bois Limestone Member, Holt Shale Member, and Coal Creek Limestone Member. The Topoka Limestone consists of alternating beds of bluish-gray to gray and brown, fossiliferous, hard to medium-hard limestone members and bluish-gray to black, fossiliferous, calcareous, silty shale members. Locally, thin coal beds occur in some of the shale members. Thickness ranges from 20-30 feet (~6-9 m).
- Leocompton Limestone and Tecumseh Shale**—From the base to the uppermost part of the Leocompton Limestone members include the Spring Branch Limestone Member, Duniphan Shale Member, Big Springs Limestone Member, Queen Hill Shale Member, Bell Limestone Member, King Hill Shale Member, and the Avoca Limestone Member. The Leocompton Limestone consists of alternating beds of tan to gray, blocky, hard, and slightly fossiliferous limestone members and yellowish-tan, olive, gray, and black, silty, clayey, and blocky to fissile shale members. The Tecumseh Shale is a gray to green, blocky, micaceous shale with beds of lightgray to brown, platy, micaceous, fine-grained sandstone. Thickness ranges from 65-75 feet (~19-23 m).
- Oread Limestone and Kanwaka Shale**—From the base to the uppermost part of the Oread Limestone members include the Toronto Limestone Member, Snyderville Shale Member, Leavenworth Limestone Member, Hechber Shale Member, Plattsmouth Limestone Member, Heumader Shale Member, and the Kereford Limestone Member. Locally, the Kereford Limestone Member is not present. Limestone members are darkgray to brown, fossiliferous, dense, and hard. The Toronto limestone and Leavenworth limestone are single-bedded and thin. Unlike these lower two limestone members, the Plattsmouth limestone is wavy-bedded to massive and thick. Shale members are gray to black, clayey to silty, and blocky to fissile. From the base to the uppermost part of the overlying Kanwaka Shale members include the Jackson Park Shale Member, Clay Creek Limestone Member, and the Stull Shale Member. The shale members are gray, bluish-gray, or grayish green, clayey, silty, and platy. The Stull shale contains a tan, thin-bedded, fine-grained sandstone. The Clay Creek limestone is a gray, fossiliferous, somewhat dense limestone. Locally, the Kanwaka Shale contains coal and the thickness ranges from 50-60 feet (~15-18 m).

- Reference**
- Ward, J. R., 1973, Geohydrology of Atchison County, northeastern Kansas: U.S. Geological Survey, Hydrologic Investigations Atlas HA-467, 2 sheets, scale: 1:62,500; <http://pubs.er.usgs.gov/publication/ha467>.

- EXPLANATION**
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| Boundaries and Locations | Geologic Unit Boundaries |
| — Township/range line | — Observed contact |
| — Section line | |
| Transportation | Hydrology and Topography |
| — U.S. highway | — Perennial stream |
| — State highway | — Intermittent stream |
| — Local road | — Water body |
| — Railroad | — Elevation contour (100-meter interval) |
| | — Elevation contour (20-meter interval) |

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.

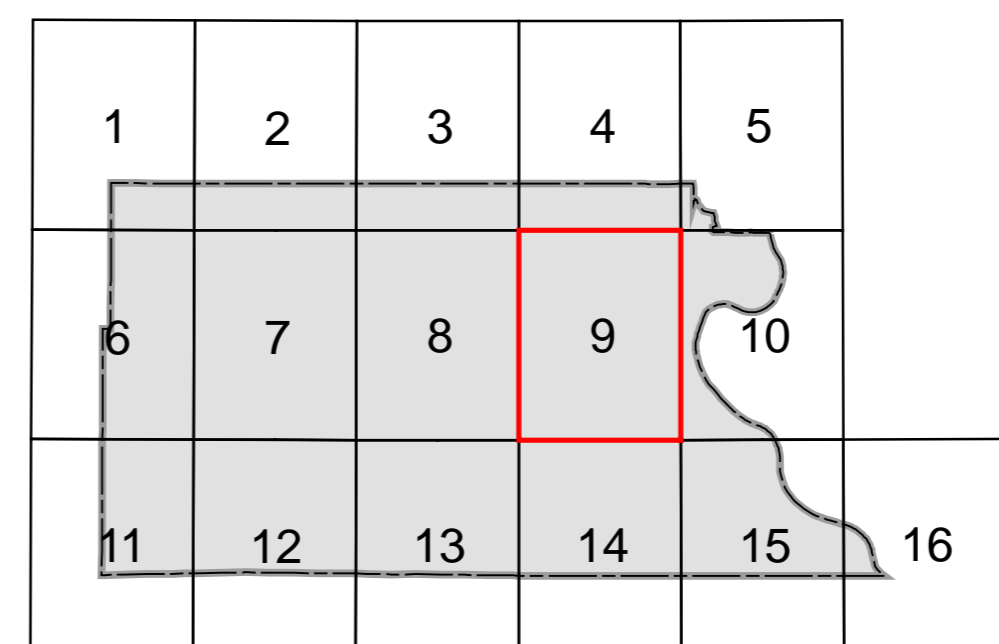
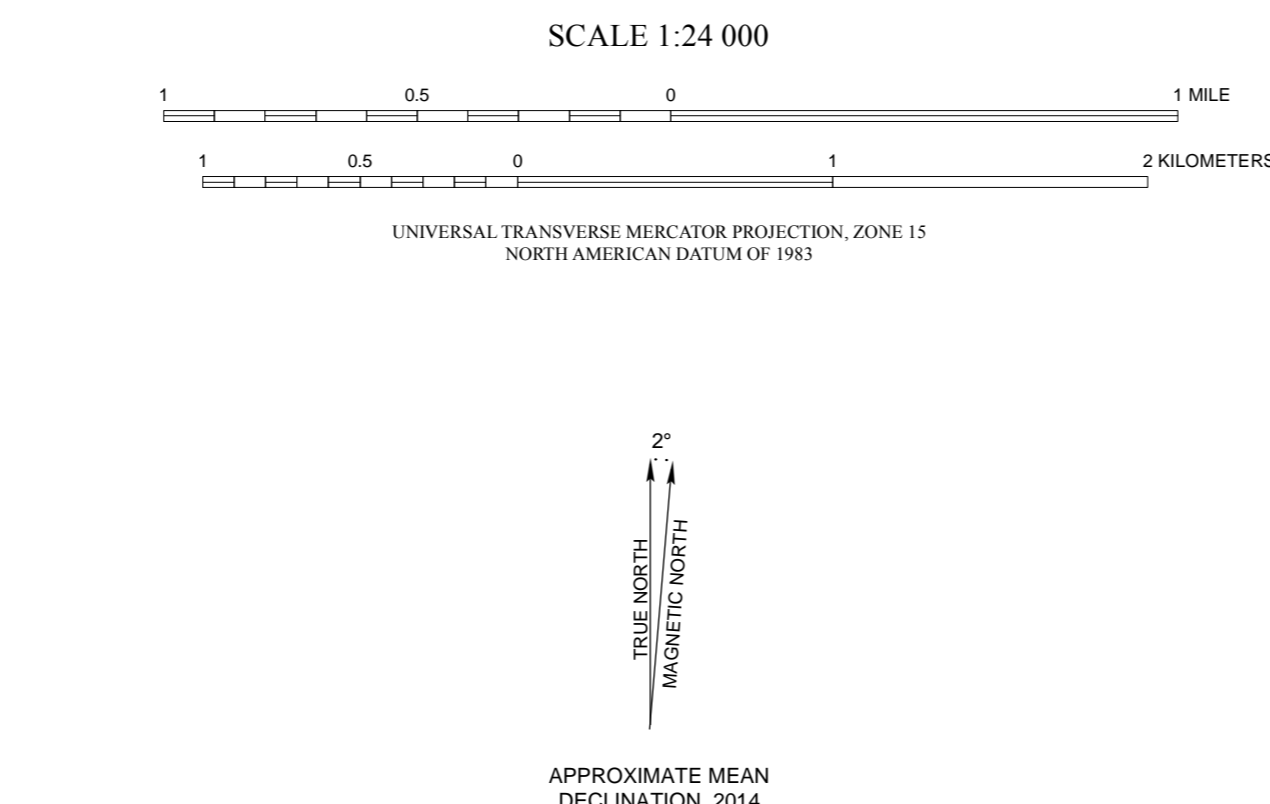
1-m LIDAR hillshades and 1-m 2010 and 2012 U.S. Department of Agriculture - Farm Services Agency (USDA-FSA) National Agriculture Imagery Program (NAIP) digital imagery were used as references in the digital mapping. USGS 7.5-min 1:24,000-scale topographic maps, USDA Natural Resources Conservation Service (NRCS) soil surveys, and other geologic maps and bulletins were used to supplement the mapping. Roads and highways are shown on the base map as represented by data from the Kansas Department of Transportation (KDOT), U.S. Census Bureau, 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 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 5-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 G13AC00168 (FY2013).

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

This map is a preliminary product and has had less scientific and cartographic review than the Kansas Geological Survey's M-series geologic maps. KGS 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.



- KANSAS**
- QUADRANGLE LOCATION
- ATCHISON COUNTY QUADRANGLES**
- Horton
 - Everest
 - Denton
 - Bendena
 - Atchison NE KS-MO
 - Whiting
 - Effingham
 - Lancaster
 - Atchison West
 - Atchison East KS-MO
 - Arrington
 - Half Mound
 - Nortonville
 - Potter
 - Oak Mills KS-MO
 - Weston MO-KS