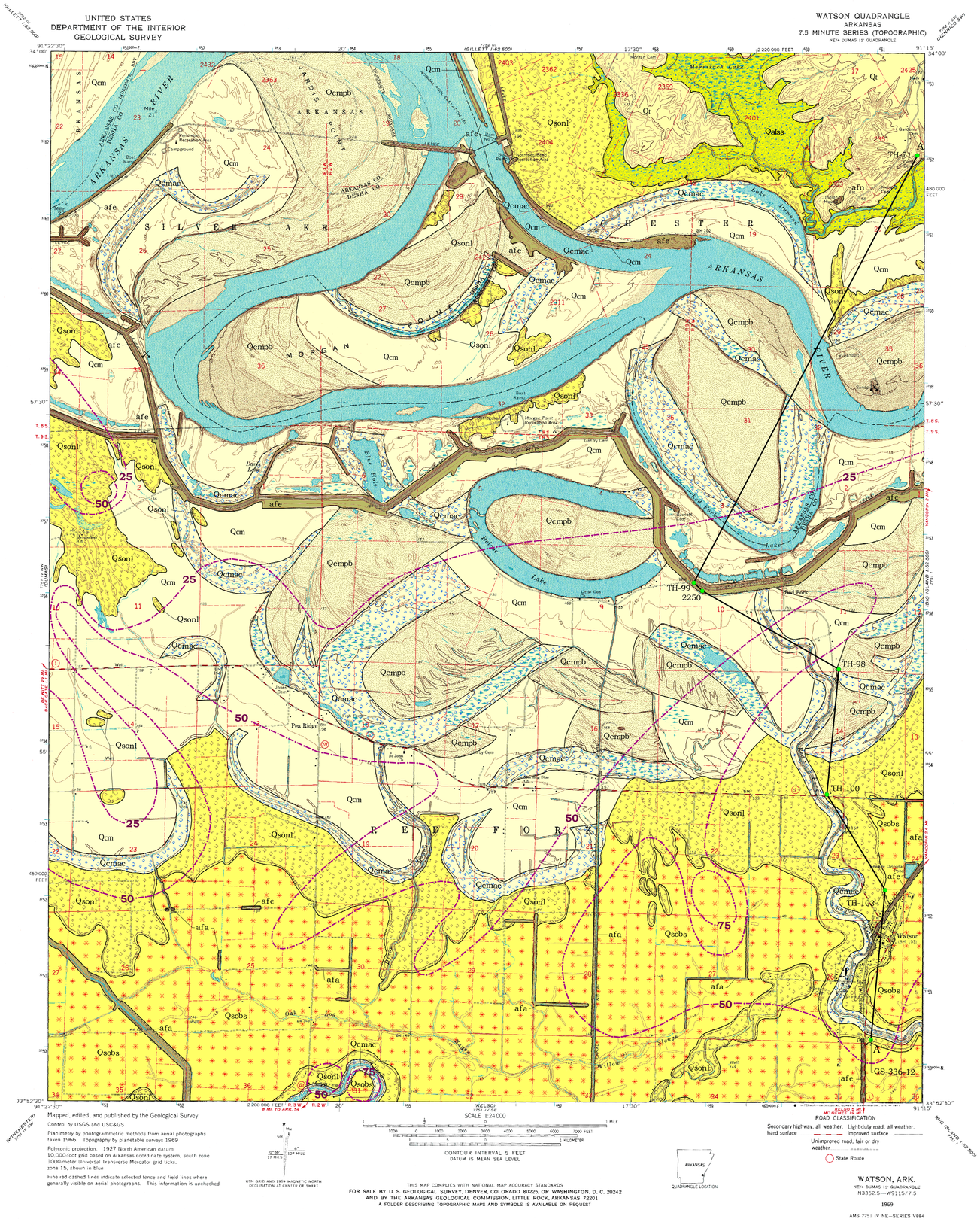
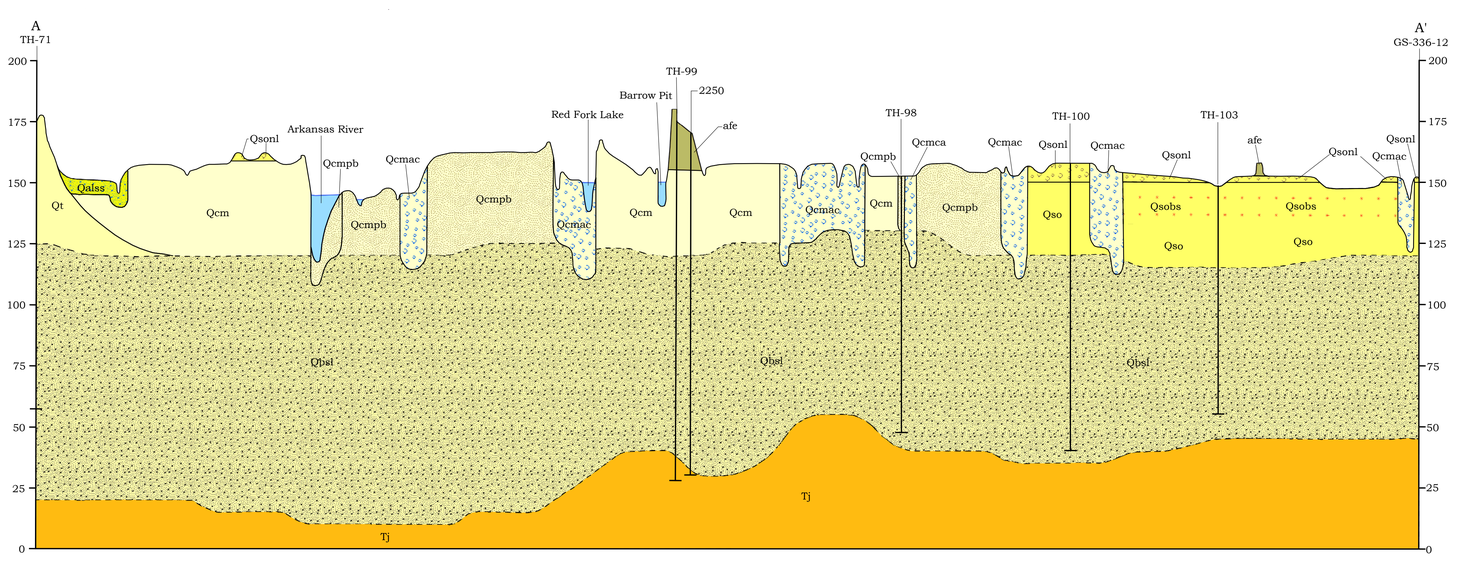
Arkansas Geological Survey
Bekki White, Director and State Geologist

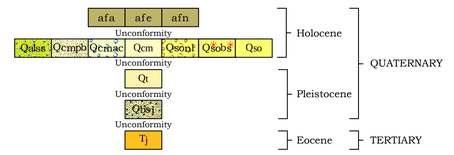
GEOLOGIC MAP OF THE WATSON QUADRANGLE, ARKANSAS AND DESHA COUNTIES, ARKANSAS





Scale:
Horizontal: 1 inch = 2,000 feet
Vertical: 1 inch = 25 feet (Exaggeration: 80x)

Correlation of Map Units



Description and Depositional Environments of Map Units

Introduction

The recognition and delineation of depositional environments are the primary means of classifying and subdividing the Holocene and Pleistocene deposits of the alluvial valley. To geologists, depositional environments are geographically restricted complexes that are generally described in geomorphic terms. Classifying sedimentary sequences according to environments of deposition is particularly feasible when dealing with geologically young sediments where the geomorphic processes responsible are currently operating in the area. Reconstruction of depositional environments for alluvial sequences is a valuable tool in geologic and geomorphic interpretations. The knowledge of these "environmental" conditions and the geomorphic processes at work thereby makes it possible to correlate and predict the range and distribution of soil types and their physical properties.

afa — ***Artificial fill agricultural*** are locally derived mixtures of clays, silts, sands and occasional gravels piled above the natural topographic surface (recognizable and mappable on a 7.5-minute quadrangle) to serve as artificial levees in agricultural practices. These agricultural levees are typically long linear features approximately 20 to 50 feet (6 to 15 meters) in width and 5 to 10 feet (1.5 to 3.0 meters) in height. They tend to be temporary features that may be modified by enlargement or obliteration.

afe — ***Artificial fill engineered/ flood control/ navigation*** are locally derived mixtures of clays, silts, sands and occasional gravels piled above the natural topographic surface (recognizable and mappable on a 7.5-minute quadrangle) to serve as highway and railroad beds, and artificial levees for engineering, flood control and navigation purposes. This artificial fill may contain a core or be capped with rock rip-rap from distant sources. The engineered levees for flood control and navigation are typically long linear features approximately 50 to 500 feet (15 to 152 meters) in width and 5 to 30 feet (1.5 to 9 meters) in height. They tend to be more permanent features when compared to the agricultural levees but still may be modified by enlargement or obliteration.

afn — ***Artificial fill Native-American (Indian Mounds)*** are locally derived mixtures of clays, silts, sands and occasional gravels piled above the natural topographic surface (recognizable and mappable on a 7.5-minute quadrangle) as large mounds. These mounds are typically round to oblong features approximately 50 to 200 feet (15 to 60 meters) across and up to 25 feet (7.5 meters) in height. These are protected cultural features with a very low potential to be modified by enlargement or obliteration.

Qalss — **Quaternary Age (Holocene)** ***Small stream deposits*** are mixtures of clays, silts, sands and gravels deposited by present smaller streams. Individual deposits are often lenticular and discontinuous. Thickness is locally variable.

Qcmac — **Quaternary Age (Holocene)** ***Channel meander point bar deposits*** form crescent-shaped ridges that are deposited on the inside of meander loops as a stream migrates laterally and downstream. As a result of this migration, a succession of bars is formed that truncate each other in a complex manner. The height of these bars may be as much as 10 feet (3 meters). The shape tends to conform to the curvature of the channel in which they were laid down. Point bars consist mainly of silts and sands. The low areas between the sandy ridges are called swales. Clays, silts and organic matter are laid down in these depressions. The combination of ridges and swale fillings creates what is known as point bar accretionary topography. Thickness is locally variable but typically ranges from 30 to 90 feet (9 to 27 meters).

Qcmpb — **Quaternary Age (Holocene)** ***Channel meander abandoned channel/course deposits*** are formed after a meander loop or segment of channel course is cut off from the main river. Over time many of the abandoned meander loops and channel courses completely fill with sediment. This process forms the familiar ox-bow lakes that are common features of the Lower Arkansas River Valley. The upper arm of a cutoff meander loop fills with sandy and silty sediments. Deposits in the lower arm are usually finer grained than those in the upper, but may contain considerable amounts of silts and coarser materials. The deposits of the central portion generally consist of uniform clays that constitute the so-called "clay plugs". Thickness is locally variable but typically ranges from 25 to 80 feet (7.5 to 24 meters).

Qcm — **Quaternary Age (Holocene)** ***Channel meander undifferentiated deposits*** are varying mixtures of unconsolidated sands, silts, clays and occasional gravels deposited by large streams and rivers that meander and shift laterally over time. The deposits that comprise this unit lack the unique geomorphic features needed to further differentiate them based on their specific depositional environments as observed in the point bar and abandoned channel/course units. Large streams and rivers establish a complex zone in which sedimentation rates are highest near the active river channel resulting in an alluvial ridge (meander belt) that is higher in elevation than the more distant floodplain. The division of this unit from *Stream overbank* deposits is primarily based on geomorphic considerations such as the presence of meander scars, point bars, and abandoned channels. Thickness is locally variable but typically ranges from 30 to 90 feet (9 to 27 meters).

Qsonl — **Quaternary Age (Holocene)** ***Stream overbank natural levee deposits*** are built up along the river banks by the deposition of sands and silts during times of flood. They normally form the highest portions of the land surface within the meander belt. Typically, natural levees are incrementally deposited sedimentary laminates formed during "overbank" floods. This is especially observable in younger natural levees as thin, parallel layers of clays, silts and fine sands. However, in older natural levees, biogenic reworking by plant roots and burrowing organisms has frequently removed most traces of bedding, leaving the clay and silt layers reworked into a homogeneous silty clay with irregular silt pockets. Lithologically, natural levees are locally, regionally, and temporally the most variable of all fluvial environments. Most natural levees overlie backswamp, undifferentiated channel meander and undifferentiated stream overbank deposits. They may be gradational with the underlying deposits rather than separated by an unconformity. Thickness is locally variable but typically ranges from thin veneer to approximately 15 feet (4.5 meters).

Qsobs — **Quaternary Age (Holocene)** ***Stream overbank backswamp deposits*** occupy inter-levee lowlands adjacent to the meander belt of large streams and rivers. Typically backswamp deposits are composed of fine-grained materials such as clays and silts. The clays exhibit color mottling (grays, browns and tans), abundant ferruginous and calcareous nodules and staining and striations resulting from shrink and swell associated with periodic wetting and drying. Organic matter is abundant both as woody fragments and scattered small particles. Locally backswamp deposits may be considerably coarser grained depending on the proximity to and number of meander belts present. Layers of silts and fine silty sands are not uncommon in areas of higher sedimentation rates, and the organic content of these deposits is also noticeably less. Thickness is approximately 20 feet (6 meters) but is locally variable.

Qso — **Quaternary Age (Holocene)** ***Stream overbank undifferentiated deposits*** (shown in cross-section only) are varying mixtures of unconsolidated sands, silts and clays derived from larger streams and rivers. The deposits that comprise this unit lack the unique geomorphic features needed to further differentiate them based on their specific depositional environments as observed in natural levee and backswamp "overbank" environments. Large streams and rivers establish a complex zone in which sedimentation rates are highest near the active river channel resulting in an alluvial ridge (meander belt) that is higher in elevation than the more distant floodplain (overbank). The division of this unit from *Channel meander* deposits is also based on geomorphic considerations such as the presence of typically flat featureless topography with natural levees and absence of meander scars, point bars, and abandoned channels. Thickness is locally variable but typically ranges from 30 to 90 feet (9 to 27 meters).

Qt — **Quaternary Age (Pleistocene)** ***Terrace deposits*** are typically comprised of clays and silts, however, some sands and occasional gravels have been observed. These materials were deposited in a relatively level to slightly inclined surface that is bounded on one side by a steeply ascending slope (e.g., a dissected upland) and on the other by a steeply descending slope (a scarp) which drops to a lower level (e.g., a stream floodplain). In this region of the Lower Mississippi Valley area, terraces are recognized as both narrow benches along modern stream valleys and as broad plains. These terrace deposits are considered older than the recent channel meander and overbank deposits, but younger than the underlying braided stream deposits. Thickness is approximately 50 feet (15 meters) but is locally variable.

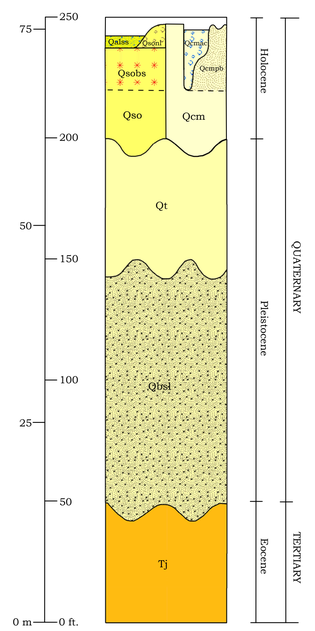
Qbsl — **Quaternary Age (Pleistocene)** ***Braided stream lower deposits*** (shown in cross-section only) were deposited from glacial outwash. These deposits consist of a lower gravel-bearing section overlain by deposits of "clean" sands. The upward gradation from coarse- to fine-grained sediments reflects a progressive lowering of the stream and sedimentation velocity as sea level gradually rose to nearly its present position. Thickness is locally variable but typically ranges from 40 to 130 feet (12 to 40 meters).

Tj — **Tertiary Age (Eocene)** ***Jackson Group*** (shown in cross-section only) consists of mostly homogenous blue-gray to dark-gray clays with widely scattered thin zones of silty clay. Thickness ranges from approximately 270 to 420 feet (82 to 128 meters).

Symbols

- Contacts *(Dashed where approximate)*
- Structure Contours *(Contour Interval 25 feet)* (-25-)
  Structure contours projected for the top of the Tertiary Jackson Group in feet above mean sea level.
- Surface well locations (TH-71)
- Subsurface well locations (TH-71)
- Sand Pit

Stratigraphic Column



Acknowledgments

This map was produced for the DEPARTMENT OF INTERIOR – NATIONAL PARK SERVICE, under the Arkansas – National Park Service (ANPS) Mapping Contract C2360086145. Special thanks to the National Park Service and private landowners who graciously allowed access to their property during this geologic investigation.

References

Allen, J. R. L., 1964, Studies in fluviatile sedimentation: Six cyclothems from the Lower Old Red Sandstone, Angle-Welsh basin, Sedimentology III, p.163-198.

Fisk, H. N., 1944, Geological investigation of the alluvial valley of the lower Mississippi River, U.S. Army Corps of Engineers Mississippi River Commission, Vicksburg, MS., 78p.

Haley, B. R., 1969, Geologic worksheet of the Red Fork Quadrangle, Arkansas Geological Commission: Open-File Report, scale 1:62,500, 1 page.

Howard, J. M., 2008, Arkansas mineral commodity database; Arkansas Geological Survey, in house data.

Krinitzsky, E. L., 1949, Geological investigation of gravel deposits in the lower Mississippi Valley and adjacent uplands: Technical Report No. 3-273, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS, 58p.

McFarland, J. D., 2004, Stratigraphic summary of Arkansas: Arkansas Geological Commission, Information Circular 36, 39p.

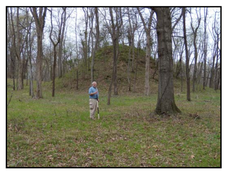
Saucier, R. T., 1967, Geological investigation of the Boeuf-Tensas Basin, lower Mississippi Valley: Technical Report No. 3-757, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS, 1 page.

Saucier, R. T., 1994, Geomorphology and Quaternary geologic history of the lower Mississippi Valley, U.S. Army Corps of Engineers Waterways Experiment Station, v. I and II, 364 p. and 28 plates.

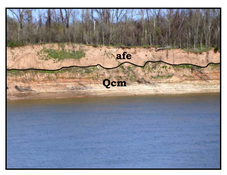
Schultz, J. R., Mabrey, P. R., Schamberger, J. H., Krinitzsky, E. L., 1951, Geology of the lower Arkansas River alluvial valley, Pine Bluff, Arkansas to mouth: Technical Report No. 3-332, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS, 32p.

About the Map

The Geologic Resource Inventory (GRI) Program of the National Park Service (NPS) provides each of 270 identified natural area National Park Service units across the nation with a geologic scoping meeting, a digital geologic map, and a geologic resource evaluation report. When possible, the GRI program provides large scale (1:24,000) digital geologic map coverage for each park's area of interest, usually composed of the 7.5-minute quadrangles that contain park lands. Maps of this scale (and larger) are useful to resource management because they capture most geologic features of interest. This map was produced for the Department of the Interior (DOI) – National Park Service and illustrates the geology of the Arkansas Post 7.5 minute quadrangle. This quadrangle was previously compiled at a 1:62,500 scale by Roger Saucier in 1967 and Boyd Haley in 1969. Copies of this map are available from the Arkansas Geological Survey, Little Rock, Arkansas.

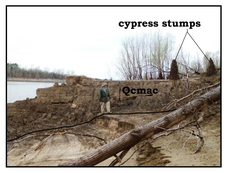


Artificial fill Native-American (afn) Indian Mound on *Terrace* (Qt) deposits.



Artificial fill engineered (afe) on *Channel Meander* (Qcm) deposits along the Arkansas River.

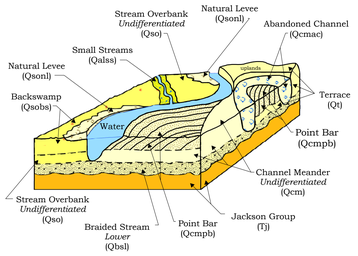
Artificial fill engineered (afe) on *Channel Meander* (Qcm) deposits.



Abandoned Channel (Qcmac) deposits along the Arkansas River - note the cypress stumps at edge of former channel.

Artificial fill engineered (afe) on *Channel Meander* (Qcm) deposits - note small distributary channel in foreground.

Typical flat topography of *Backswamp* (Qsobs) deposits.



An illustration of the principle depositional environments involved in a typical meander belt (modified from Allen 1964).

Disclaimer

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2009

Revised Date:
Scale: 1 : 24,000
Digital Compilation: Jerry W. Clark