Map Unit Properties Table: Arkansas Post National Memorial

Colored units are mapped within Arkansas Post National Memorial.

Age	Map Unit (Symbol)	Geologic Description	Geologic Features and Processes	Geologic Issues	Geologic History
QUATERNARY (Recent)	Artificial fill, agricultural (Qafa)	**Qafa** appears as long, linear topographic highs composed of a mixture of locally derived clays, silts, sands, and some gravels. Individual ridges are 6 to 15 m (20 to 50 ft) wide and 2 to 3 m (5 to 10 ft) high. These features serve as levees that are frequently modified, enlarged, or obliterated. Artificial units were mapped to prevent confusion for future mappers after years of weathering, vegetation, and land-use changes.	Geologic Connections with Memorial Stories—Agriculture accelerated during the mid 1800s through the early 1900s. Fertile soils of the floodplains attracted farmers whereas seasonal floods often destroyed crops.	Past Land Use—**Qafa** is an anthropogenic unit.	Cenozoic Era (the past 65.5 million years): River Valley Evolution and Ice Age Glaciation—Part of the long history of human settlement in the area.
	Artificial fill, engineered/flood control/navigation (Qafe)	Similar in composition to **Qafa**, **Qafe** may also contain a core or be capped with rock riprap from distant sources. The topographic high ground formed by **Qafe** serves as highway and railroad beds, and engineered levees for flood control and navigation. The latter type of feature is 15 to 150 m (50 to 500 ft) long and 2 to 9 m (5 to 30 ft) high. **Qafe** is more permanent in purpose than **Qafa**. Artificial units were mapped to prevent confusion for future mappers after years of weathering, vegetation, and land-use changes.	Fluvial features and processes—**Qafe** mimics a natural levee (**Qsonl**) with more extreme slopes.	Flooding and Fluvial Geomorphology—**Qafe** is associated with controlling the morphology of the Arkansas River and dredging practices. Past Land Use—**Qafe** is an anthropogenic unit.	Cenozoic Era (the past 65.5 million years): River Valley Evolution and Ice Age Glaciation—Representative of the ongoing struggle between human activities and the Arkansas River. Levees attempt to protect adjacent areas from flooding, and navigational channels need to be consistently passable.
	Artificial fill, Native-American (Indian Mound) (Qafn)	**Qafn** is similar in composition to **Qafa** and **Qafe**, but appears are distinct, high mounds above the natural land surface. The mounds are typically round to oblong and range from 15 to 60 m (50 to 200 ft) across and as much as 8 m (25 ft) high. Artificial units were mapped to prevent confusion for future mappers after years of weathering, vegetation, and landuse changes. **Qafn** is mapped within memorial boundaries at the Osotouy Unit.	Geologic Connections with Memorial Stories—Mounds occur throughout the area (and within the Osotouy Unit). Provide evidence of early American Indian inhabitation. The Quapaw tribe did not construct the mounds. Paleontological Resources—Modern bison remains were collected at the mound complex within the Osotouy Unit.	Past Land Use—An access road crosses a mound at the Osotouy Unit causing exposure of archeological resources.	Cenozoic Era (the past 65.5 million years): River Valley Evolution and Ice Age Glaciation—Part of the long history of human settlement in the area.
QUATERNARY (Holocene)	Small stream deposits (Qalss)	**Qalss** comprises mixtures of clays, silts, sands, and gravels in modern streams and small rivers. Individual deposits of **Qalss** are lenticular (lens-shaped) and discontinuous in outcrop with variable layer-thickness. **Qalss** is mapped within park boundaries at the Osotouy Unit.	Fluvial features and processes—**Qalss** is the youngest naturally occurring unit within the memorial area, accumulating on smaller streams and bayous.	Flooding and Fluvial Geomorphology—Menard Bayou is depositing **Qalss** within the Osotouy Unit. Slope Movements—Unconsolidated units may be prone to mass wasting when exposed on slopes. Seismicity—Unconsolidated materials transmit seismic waves and amplify shaking. **Qalss** could be prone to liquefaction.	Cenozoic Era (the past 65.5 million years): River Valley Evolution and Ice Age Glaciation—**Qalss** is the youngest, naturally occurring geologic unit in the map area.
	Channel meander point bar deposits (Qcmpb)	**Qcmpb** occurs in crescent-shaped ridges of silt and sand as much as 3 m (10 ft) high. These ridges are separated by lower swales that trap clay, silt, and organic matter. Thickness of **Ocmpb** is variable, but ranges from 9 to 27 m (30 to 90 ft). **Qcmbp** is mapped within memorial boundaries at the Memorial Unit.	Geologic Connections with Memorial Stories—Coarser grained deposits of **Qcmpb** and **Qt** are more resistant to erosion and form high ground above the lowlands flanking the Arkansas River. This high ground was the reason Arkansas Post was established at this location. Fluvial Features and Processes—**Qcmpb** is part of a complex zone in which sedimentation rates are highest near the active river channel. This difference causes the development of an alluvial ridge (meander belt) that is elevated above an adjacent floodplain (overbank). As a stream migrates laterally and downstream, a succession of bar deposits truncate one another forming a complex landform—point bar accretionary topography. The morphology of **Qcmpb** conforms to the curvature of the source channel.	Flooding and Fluvial Geomorphology—Coarser deposits of **Qcmpb** readily transmit groundwater flow, making them productive aquifers. Slope Movements—Unconsolidated units may be prone to mass wasting when exposed on slopes. Past Land Use—Sand pits are located within **Qcmpb**. Seismicity—Unconsolidated materials transmit seismic waves and amplify shaking. **Qcmpb** could be prone to liquefaction.	Cenozoic Era (the past 65.5 million years): River Valley Evolution and Ice Age Glaciation—**Qcmpb** accumulated on the landscape throughout the Holocene Epoch as rivers meandered across their valleys.

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Age	Map Unit (Symbol)	Geologic Description	Geologic Features and Processes	Geologic Issues	Geologic History
QUATERNARY (Holocene)	Channel meander abandoned channel/course deposits (Qcmac)	**Qcmac** is of variable composition. The lower arm of the meander fills with fine-grained silts, sands, and clays, whereas the upper arm of the abandoned meander contains coarser sand and silt deposits. As the inactive, cutoff channel slowly fills, a uniform clay "plug" forms. Thickness of **Qcmac** varies from 8 to 24 m (25 to 80 ft). **Qcmac** is mapped within memorial boundaries at the Osotouy Unit.	Fluvial Features and Processes—**Qcmac** is part of a complex zone in which sedimentation rates are highest near the active river channel. This difference causes the development of an alluvial ridge (meander belt) that is elevated above an adjacent floodplain (overbank). **Qcmac** forms after a meander loop is cut off from the active river channel, resulting in an oxbow lake that slowly fills with sediment.	Flooding and Fluvial Geomorphology—Finer grained material in **Qcmac** act as aquicludes or confining layers to groundwater flow. Slope Movements—Unconsolidated units may be prone to mass wasting when exposed on slopes. Past Land Use—Sand pits are locally located within **Qcmac**. Seismicity—Unconsolidated materials transmit seismic waves and amplify shaking. **Qcmac** could be prone to liquefaction.	Cenozoic Era (the past 65.5 million years): River Valley Evolution and Ice Age Glaciation—**Qcmac** accumulated on the landscape throughout the Holocene Epoch as rivers meandered across their valleys.
	Channel meander undifferentiated deposits (Qcm)	**Qcm** is a mixture of unconsolidated sands, silts, and clays with some gravel deposited by streams and rivers that meander and shift laterally across the landscape over time. Locally variable thickness, ranging from 9 to 27 m (30 to 90 ft).	Fluvial Features and Processes—**Qcm** is part of a complex zone in which sedimentation rates are highest near the active river channel. This difference causes the development of an alluvial ridge (meander belt) that is elevated above an adjacent floodplain (overbank). **Qcm** typically contains meander scars, point bars, and abandoned channels.	Flooding and Fluvial Geomorphology—Complex patterns of **Qcm** cause spatial variances in the hydrogeologic system. Slope Movements—Unconsolidated units may be prone to mass wasting when exposed on slopes. Seismicity—Unconsolidated materials transmit seismic waves and amplify shaking. **Qcm** could be prone to liquefaction.	Cenozoic Era (the past 65.5 million years): River Valley Evolution and Ice Age Glaciation—**Qcm** accumulated on the landscape throughout the Holocene Epoch as rivers meandered across their valleys.
	Stream overbank natural levee (Qsonl)	**Qsonl** typically features reworked (homogenized) clay, silt, and fine-sand deposits and forms the highest elevations within the meander belt system. Locally, thickness is variable, but ranges from a thin veneer to approximately 5 m (15 ft). **Qsonl** is mapped within memorial boundaries at the Osotouy Unit.	Geologic Connections with Memorial Stories—Fertile overbank deposits provided ample substrate for agricultural development throughout the area. Fluvial Features and Processes—**Qsonl** is part of a complex zone in which sedimentation rates are highest near the active river channel. This difference causes the development of an alluvial ridge (meander belt) that is elevated above an adjacent floodplain (overbank). **Qsonl** builds up as areas of higher elevation along the river banks during times of flooding. Natural levees form as incrementally deposited sedimentary laminates (layers) during successive overbank flood events. In older levees, plant roots and burrowing fauna have obliterated much of the original layering features. Levees are highly variable, but typically overlie other fluvial deposits such as **Qsobs**, **Qcmpb**, **Qcmac**, **Qcm**, and **Qso** with gradational contacts (i.e. not separated by an erosional surface).	Flooding and Fluvial Geomorphology—Deposits of **Qsonl** at the Osotouy Unit affect the course of Menard Bayou. Slope Movements—Unconsolidated units may be prone to mass wasting when exposed on slopes. Seismicity—Unconsolidated materials transmit seismic waves and amplify shaking. **Qsonl** could be prone to liquefaction.	Cenozoic Era (the past 65.5 million years): River Valley Evolution and Ice Age Glaciation—**Qsonl** accumulated on the local landscape as the Arkansas River established at least seven meander belts during the Holocene Epoch.
	Stream overbank backswamp deposits (Qsobs)	**Qsobs** contains fine-grained clays and silts as well as abundant organic matter, such as woody fragments. The clays are mottled in colors such as grays, browns, and tans. Abundant ferruginous (iron-bearing) and calcareous (containing calcium carbonate) nodules occur within this unit. **Qsobs** is of variable thickness, but averages 6 m (20 ft).	Geologic Connections with Memorial Stories—Fertile overbank deposits provided ample substrate for agricultural development throughout the area. Fluvial Features and Processes—**Qsobs** is part of a complex zone in which sedimentation rates are highest near the active river channel. This difference causes the development of an alluvial ridge (meander belt) that is elevated above an adjacent floodplain (overbank). **Qsobs** occupies the low-lying areas between natural levees (**Qsonl**) adjacent to the meander belts of large streams and rivers. Staining and striations within **Qsobs** results from shrink-and-swell cycles associated with periodic wetting and drying.	Slope Movements—Unconsolidated units may be prone to mass wasting when exposed on slopes. Seismicity—Unconsolidated materials transmit seismic waves and amplify shaking. **Qsobs** could be prone to liquefaction.	Cenozoic Era (the past 65.5 million years): River Valley Evolution and Ice Age Glaciation—**Qsobs** accumulated on the local landscape as the Arkansas River established at least seven meander belts during the Holocene Epoch.

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Age	Map Unit (Symbol)	Geologic Description	Geologic Features and Processes	Geologic Issues	Geologic History
QUATERNARY (Holocene)	Stream overbank undifferentiated deposits (Qso)	**Qso** contains varying mixtures of sands, silts, and clays that were deposited by larger streams and rivers. **Qso** typically displays flat, featureless topography with natural levees. **Qso** is not exposed at the surface in the memorial area, but appears on regional cross sections.	Geologic Connections with Memorial Stories—Fertile overbank deposits provided ample substrate for agricultural development throughout the area. Fluvial Features and Processes—**Qso** is part of a complex zone in which sedimentation rates are highest near the active river channel. This difference causes the development of an alluvial ridge (meander belt) that is elevated above an adjacent floodplain (overbank).	Flooding and Fluvial Geomorphology— Complex patterns of **Qso** cause spatial variances in the hydrogeologic system. Slope Movements—Unconsolidated units may be prone to mass wasting when exposed on slopes. Seismicity—Unconsolidated materials transmit seismic waves and amplify shaking. **Qso** could be prone to liquefaction.	Cenozoic Era (the past 65.5 million years): River Valley Evolution and Ice Age Glaciation—**Qso** accumulated on the local landscape as the Arkansas River established at least seven meander belts during the Holocene Epoch.
QUATERNARY (Pleistocene)	Terrace deposits (Qt)	**Qt** contains clays and silts with some sands and gravels in deposits approximately 15 m (50 ft) thick with local variations. **Qt** occurs as both narrow benches along modern stream valleys and as broad plains. **Qt** is mapped within memorial boundaries at the Memorial and Osotouy units.	Geologic Connections with Memorial Stories—Coarser grained deposits of **Qt** and **Qcmpb** are more resistant to erosion and form high ground above the lowlands flanking the Arkansas River. This high ground was the reason Arkansas Post was established at this location. Fluvial features and processes—**Qt** is part of an evolving fluvial system. **Qt** was deposited on a relatively level to slightly inclined surface bounded on one side by a steeply ascending slope (e.g., a dissected upland surface), and bounded on the other side by a steeply descending slope (an erosional scarp), which drops to a lower level (e.g., a younger stream floodplain surface). Paleontological resources—Petrified wood, invertebrate fossils, and vertebrate fossils are found regionally in Pleistocene terrace deposits.	Flooding and Fluvial Geomorphology—Memorial Unit is located on **Qt** rising above the active floodplain of the Arkansas River. Slope Movements—Unconsolidated units may be prone to mass wasting when exposed on slopes. Seismicity—Unconsolidated materials transmit seismic waves and amplify shaking. **Qt** could be prone to liquefaction.	Cenozoic Era (the past 65.5 million years): River Valley Evolution and Ice Age Glaciation—**Qt** accumulated during the colder climates of the Pleistocene ice ages. **Qt** is older than recent channel meander (**Qcmpb**, **Qcmac**, **Qcm**) and overbank (**Qsonl**, **Osobs**, and **Qso**) deposits, but younger than underlying braided stream deposits (**Obsl**).
	Braided stream lower deposits (Qbsl)	Glacial outwash gravels dominate the lower portions of **Qbsl** overlain by well-sorted sands. This upward fining in the sedimentary grainsize indicates the progressive lowering of stream (and sedimentation) velocity during sea level rise upon glacial melting. Thickness of **Qbsl** ranges from 12 to 40 m (40 to 130 ft). Like **Qso**, **Qbsl** is not exposed at the surface in the memorial area but appears on regional cross sections.	Paleontological Resources—Petrified wood, invertebrate fossils, and vertebrate fossils are found regionally in Pleistocene braided stream deposits.	Seismicity—Unconsolidated materials transmit seismic waves and amplify shaking.	Cenozoic Era (the past 65.5 million years): River Valley Evolution and Ice Age Glaciation—**Qbsl** accumulated during the colder climates of the Pleistocene ice ages.
PALEOGENE (Eocene)	Jackson Group (Tj)	**Tj** consists of rather homogenous blue-gray to dark gray clay and some silty clay layers. Thickness ranges from 80 to 130 m (270 to 420 ft). Like **Qso** and **Qbsl**, **Tj** is not exposed at the surface in the memorial area but appears on regional cross sections.	Paleontological Resources—**Tj** can be rich in molluscan fossils, other invertebrate fossils, and some invertebrate molds.	Flooding and Fluvial Geomorphology—Fine-grained clays in **Tj** act as aquicludes or confining layers to groundwater flow. Economic Resource Development—**Tj** contains lignite and may be a source of coal-bed natural gas or methane.	Cenozoic Era (the past 65.5 million years): River Valley Evolution and Ice Age Glaciation—**Tj** formed during an Eocene marine incursion into the Mississippian Embayment.