

Base map compiled by Illinois State Geological Survey from digital data provided by the United States Geological Survey. Compiled from imagery dated 1998.

North American Datum of 1983 (NAD 83) Projection: Transverse Mercator 10,000-foot ticks: Illinois State Plane Coordinate system, east and west zones zone (Transverse Mercator) 1,000-meter ticks: Universal Transverse Mercator grid system, zone 16

Recommended citation:

Nelson, W.J., and J. Hintz, 2007, Geology of Karnak Quadrangle, Johnson, Pulaski, and Massac Counties, Illinois: Illinois State Geological Survey, Illinois Geologic Quadrangle Map, IGQ Karnak-G, 2 sheets, 1:24,000, report, 8 p.

SCALE 1:24,000										
1		1/2			0					1 MILI
	1000	0	1000	2000	3000	4000	5000	6000	7000 FEET	
		1	.5		0			1 k	KILOMETER	

BASE MAP CONTOUR INTERVAL 10 FEET SUPPLEMENTARY CONTOUR INTERVAL 5 FEET NATIONAL GEODETIC VERTICAL DATUM OF 1929

Released by the authority of the State of Illinois: 2007

Geology based on field work by J. Nelson and J. Hintz, 1999–2000.

Digital cartography by J. Domier, D. Byers, J. Magnotta, M. Bentley, and S. Geegan, Illinois State Geological Survey.

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IGQ Karnak-G Sheet 1 of 2

CACHE VALLEY

	SYSTEM	SERIES and STAGE		FORMATION		GRAPHIC COLUMN THICKNESS (FEET)	UNIT	
		HC	DLOCENE	Ca	hokia	<u> </u>	А	В
UATERNARY	UATERNARY	EISTOCENE	WISCONSINAN	Henry	Equality	0–130 0–155	С	D
σ		Ы	ILLINOIAN	P	earl	Bedrock 0–30	E	Ξ

SOUTH OF CACHE VALLEY

SYSTEM	SERIES and STAGE		FORMATION	GRAPHIC COLUMN	THICKNESS (FEET)	UNIT
ä≻	ENE	WISCONSINAN	Peoria Silt		0-20	F
ATE	STOC		Loveland Silt		0-17	H
TER- QU TIARY N	PLIOCENE MIOCENE		Mounds Gravel		0–70	I
RETACEOUS	MAASTRICHTIAN		McNairy		0–145	J
ß	С	AMPANIAN	Post Creek	0.00 Bedrock	0–57	к

BEDROCK

SYSTEM	SERIES	FORMATION	MEMBER	GRAPHIC COLUMN	THIC (F	UNI	
		Tar Springs				30	L
		Glen Dean Limestone				50	М
		Hardinsburg			-	70	N
		Golconda	Haney Limestone		140	70–80	0
		Coloonda	Fraileys Sh.			50–60	0
			Beech Creek Ls.			5–10	

A Cahokia Formation Silt, sand, and gravel. Clayey and sandy silt, mottled in brownish and yellowish gray, moderately stiff, and massive to laminated. Pellets and fracture-fillings of iron and manganese oxides are common. Sand and gravel occur mainly in the lower part of the unit, forming a fining-upward sequence. Gravel is chiefly chert pebbles derived from the Mounds Gravel south of Cache Valley and chiefly fragments of sedimentary rocks north of the Cache. Small streams tributary to the Ohio River have wide, flat bottoms that represent an erosional bench, not a terrace. The Cahokia is only a few feet thick in these valleys. The Cahokia consists of Holocene alluvial deposits. The lower contact may be erosional to gradational; this unit is difficult to distinguish from the Equality Formation.

B Cahokia Formation, silty clay facies Clay and silty clay. Medium to dark olive gray, greenish gray, and brownish gray clay and silty clay have absent or weak lamination and are rich in organic matter. This facies is confined to present or former sloughs and swamps in the Cache Valley and its major tributaries. Within the main Cache Valley, the silty facies fills abandoned channels that date to the final course of the Ohio River in the valley and overlies the Henry Formation. Elsewhere, this unit overlies the Equality Formation with a gradational contact and is difficult to differentiate from the Equality.

C Henry Formation Sand, gravel, and silt. Chiefly sand that is light gray to light yellowish gray and very fine to very coarse. Grains are subrounded to subangular and are composed of roughly 90% quartz and 10% chert and other lithic fragments. Sand occurs in upward-fining sequences that grade up to silt or silty clay. Gravel is rounded to well-rounded and dominantly fine "pea gravel," in which most pebbles are smaller than about 1/4 inch and few exceed about 1/2 inch in diameter. Chert is the major constituent, followed by quartz and a wide variety of sedimentary, igneous, and metamorphic rock fragments derived from glacial outwash. The sand and gravel typically are loose, lacking a significant clay or silt matrix. The Henry underlies the main Cache Valley, where it may exceed 128 feet in thickness in places. It is interpreted as fluvial channel, point bar, and midchannel bar deposits of Wisconsinan age, at which time the Ohio, Cumberland, and Tennessee Rivers flowed through the Cache Valley (Fisk 1944, Masters and Reinertsen 1987). Thin loess (Peoria Silt) or dune sand (alum) overlies the Henry in many places. The lower contact, known only from well records, typically is erosional, but the Henry is difficult to differentiate from the Pearl Formation.

D Equality Formation Silt, clay, and minor sand and gravel. Silt and clay are medium to dark gray to brown; less commonly they are greenish to bluish gray. Some reddish to orange-brown layers occur in the upper part of the unit. Consistency varies from stiff to soft, plastic "gumbo," and structure varies from massive to finely laminated or varved. Wood fragments and decomposed vegetation are common. Lenses of sand and gravel ranging up to about 6 feet thick occur chiefly in the lower part of unit. The Equality underlies all wide, flat-bottomed valleys tributary to the main Cache Valley. These valleys are deeply incised into bedrock. The Equality commonly is 50 to 100 feet thick and reaches 155 feet in a well near Forman. This formation is interpreted as fine-grained fluvial overbank sediments and slack-water lacustrine deposits that accumulated during the Wisconsinan age. The Equality intergrades laterally with the Henry Formation and overlies older units unconformably.

E Pearl Formation Sand and gravel. Within the Cache Valley this unit is lithologically similar to the Henry Formation, except that the Pearl contains coarser gravel (many pebbles larger than 1 inch) and scattered cobbles and boulders. The Pearl may be more than 30 feet thick in places, underlying the Henry Formation and resting on Mississippian bedrock. Several boreholes in tributaries of the Cache encountered coarse reddish brown gravel in a clay matrix underlying the Equality Formation. This gravel also may be Pearl Formation. A possible outcrop of the Pearl is in the bank of Patterson Branch near the center of Sec. 28, T14S, R3E. In this outcrop the wellworn, tightly packed gray chert gravel is overlain by Peoria Silt. The Pearl Formation is fluvial and possibly colluvial sediment of Illinoian age. The lower contact is uncon**O Golconda Formation** Limestone and shale. The formation is divided into three members. The Haney Limestone Member at the top is composed of medium to dark gray and brownish gray limestone that forms discontinuous ledges. The limestone is largely skeletal wackestone, packstone, and grainstone with a few beds of lime mudstone. Rounded grains and ooids are common, and cross-bedding is present. Fossils include brachiopods, bryozoans, blastoids, crinoids, and rugose corals. Beds typically are 4 to 12 inches thick and are separated by wavy to hummocky, argillaceous partings. The Fraileys Shale Member is dominantly shale with thin interbeds of limestone in the upper part. Most of the shale is greenish gray to dark gray, fissile, and calcareous and contains marine fossils. The limestone is similar to that of the Haney Member but occurs in thinner beds with higher clay content and abundant fossils. An interval of red and green variegated mudstone occurs near the top. The Beech Creek Limestone Member at the base of the Golconda is less than 10 feet thick, and only one exposure was found: the cutbank of the Cache River at the foot of Wildcat Bluff in the SW¼ of Sec. 19, T13S, R3E.

P Cypress Formation Sandstone, siltstone, and shale. The upper one-half to twothirds of this unit is concealed by loess; outcrops and drill holes in adjacent quadrangles show the upper Cypress to be interbedded shale, siltstone, and thin-bedded sandstone. The lower part of the Cypress is sandstone that forms prominent cliffs 15 to 40 feet high. The white to light gray, very fine- to fine-grained quartz arenite is slightly friable and has a sugary texture. Sandstone near the top of the cliffs tends to have planar to wavy lamination or thin bedding. In the lower part of the cliffs, the sandstone is thickly bedded to massive and in places shows unidirectional, south- or west-facing planar and trough cross-bedding. Convolute or slumped laminations, which partially or completely obscure cross-bedding, are seen on many outcrops. Also common are "healed" high-angle fractures. The lower contact was not observed, but, in neighboring quadrangles, it is erosional.

Q Ridenhower Formation Shale, thin limestone. The unit is dominantly shale that is dark gray, olive-gray, and greenish gray, soft and fissile, and lacks silt. Siderite bands and nodules are numerous. Limestone interbeds a few inches to several feet thick are dark bluish gray, coarse-grained, very fossiliferous wackestone and pack-stone. The lower contact is sharp.

R Bethel Sandstone Sandstone, sandy limestone. Very fine- to fine-grained sandstone commonly weathers brownish orange to dark brown. Much of the sandstone, especially in the lower part, is strongly calcareous and contains bryozoans, brachiopods, and echinoderms. Weathering commonly removes the calcite, leaving a highly porous, iron-stained rock. Near the base of the unit, sandstone intergrades with sandy limestone: skeletal wackestone, packstone, and grainstone. Sedimentary features include planar lamination, cross-lamination, ripple cross-lamination, and small-scale trough and herringbone cross-bedding. A conglomerate of shale pebbles is found locally at the erosional lower contact.

S Paoli Limestone Limestone, shale, and minor siltstone. The Paoli is divisible into four members. The Downeys Bluff Limestone Member at the top comprises an upper limestone 10 to 15 feet thick, a middle shale 10 to 15 feet thick, and a lower limestone 5 to 10 feet thick. Limestone is largely light gray, fine to coarse skeletal and oolitic grainstone, portions of which are laminated and other portions are cross-bedded. Sparse pink to orange crinoid fragments occur in the upper limestone bench. The middle shale of the Downeys Bluff is dark gray to greenish gray, soft, and fissile. It contains abundant marine fossils and thin lenses and interbeds of shaly limestone. The Yankeetown Member is 10 to 15 feet thick and comprises green to purple variegated, calcareous mudstone at the top, variegated and fissile silty shale in the middle, and gray massive siltstone at the base. The only good exposure is at an abandoned limestone quarry about one-half mile northeast of Belknap. The Shet-lerville and Levias Limestone Members together are 75 to 100 feet thick. The only outcrop of the Shetlerville observed during mapping is 8 feet of light gray, fine- to coarse-grained crinoidal packstone and grainstone with thin shale interbeds in the

