

**KANSAS GEOLOGICAL SURVEY
OPEN-FILE REPORT 97-67**

Kansas River Field Trip
November 18, 1997

by

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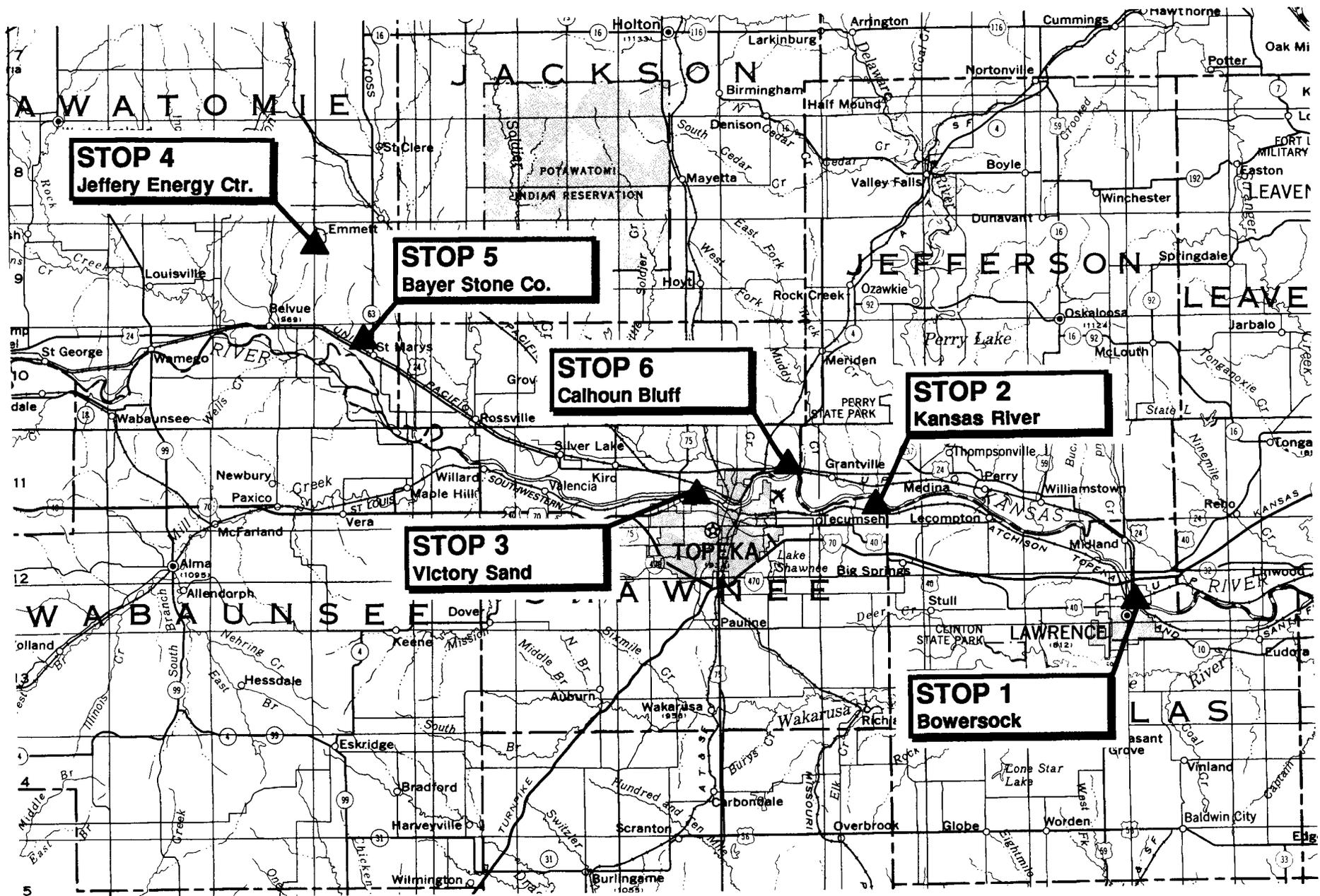


Figure 1. Kansas River Field Trip - Stop Locations

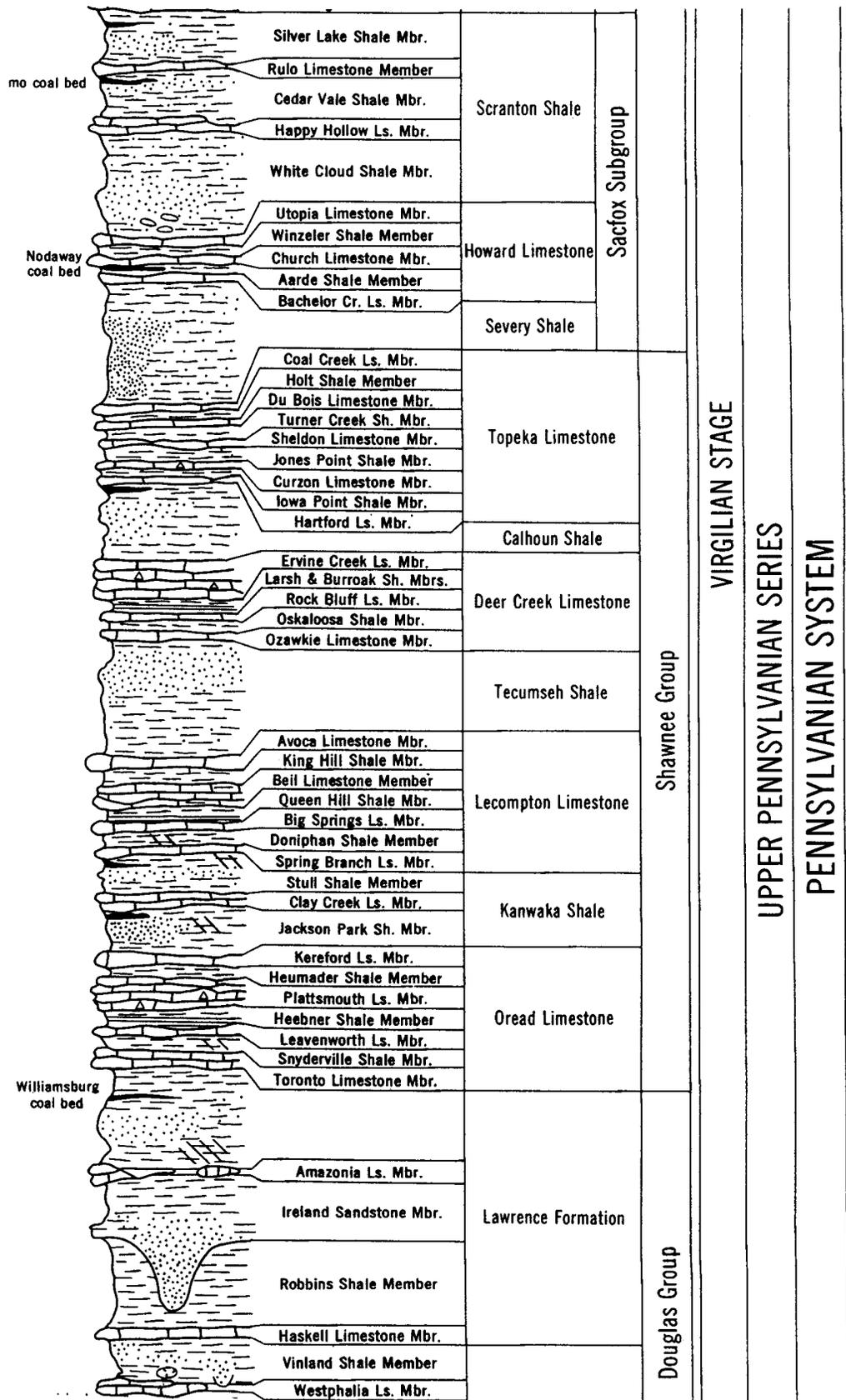


Figure 2 (cont.). Stratigraphic Classification of Upper Pennsylvanian and Lower Permian Rocks in Kansas (from Zeller, 1968)

KANSAS RIVER FIELD TRIP

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This field trip explores the Kansas River valley between Lawrence and St. Marys (Fig. 1). The Kansas River means different things to different people. It is a source of water, construction materials, recreation, food, scenic beauty, and even electrical power. The competing uses of the river have been debated locally and on the state level and will be discussed again in the upcoming legislative session. The Kansas Geological Survey and other state agencies are preparing a report to the legislature addressing the feasibility of establishing a recreational corridor along the river. This report, and the resulting political decisions that will be made based on the information and conclusions in the report, will be major factors in determining the future use of the Kansas River.

Most of the bedrock (Fig. 2) we'll see on the eastern leg of the trip is Pennsylvanian in age, interbedded limestones and shales deposited by a shallow sea about 330 million years ago. In the western part of the trip, we'll be in slightly younger rocks--limestones, shales, and cherts deposited during the Permian Period. The river itself is significantly younger, and probably started as a stream that drained the meltwater from glaciers that moved into northeastern Kansas about 500,000 years ago.

In the following roadlog, the number beside each entry is the total elapsed mileage on the trip. The number above, in parenthesis, is the distance from the previous stop.

0.0 Leave the KGS parking lot and proceed to 19th and Iowa. Set trip odometers at 0.0 and drive north on Iowa Street (U.S. Highway 59).

(0.2)
0.2 Pass Pioneer Cemetery on the west, the final resting place of several victims of Quantrill's Civil War raid on Lawrence. R.C. Moore, director of the KGS from 1917 to 1954 and the person after whom Moore Hall is named, is also buried here. Here we climb over Daisy Hill, a southwest extension of Mount Oread, the type locality of the Oread Limestone, which caps these hills and forms a prominent escarpment from Atchison County

southward into southern Kansas. Our elevation here is 1,020 feet.

(1.3)
1.5 6th Street. Turn east (right).

(0.2)
1.7 The two most prominent limestone members of the Oread Limestone are exposed in this road cut, the Plattsmouth at the top and the Toronto just above road level. Below the Toronto, at road level, is the Lawrence Formation, which is mostly shale and forms the eastern slopes of the Oread escarpment.

(1.6)
3.1 To the south is Watson Park, named after former Lawrence city manager Buford Watson. At the north end of the park, just south of Sixth Street, is a sculpture, inspired by the Kansas River, entitled "Confluence."

(0.1)
3.2 At the east side of Watson Park, turn north (left) just before reaching the railroad spur and follow the gravel road to the north. Cross the railroad tracks and then turn right following the tracks to a small parking area under the Massachusetts Street bridge. This is **STOP 1, Bowersock Mills and Power Company**. In 1955, there were five hydroelectric dams in Kansas. Today, this is the only one. It has produced electricity since 1886 and today generates 12 to 13 million kilowatts a year, enough electricity for about 1,000 homes. Originally the electricity was used to power a mill here; today the electricity is put into the local electrical grid through the substation we passed on Sixth Street.

(0.2)
3.4 Return to Sixth Street and turn west (right) and go a short distance to Tennessee Street and turn north (right).

(0.3)
3.7 Curve west onto 5th Street and proceed to Indiana Street. Turn north (right).

(0.5)
4.2 Cross the Santa Fe and Burlington Northern tracks and enter Burcham Park to

view the Kansas River. The Kansas River drains the northern half of Kansas, part of northeast Colorado, and much of Nebraska south of the Platte River--altogether about 60,000 square miles. It carries an average of about 4.75 million acre-feet of water past this point every year. The elevation here is 818 feet, making this the lowest point on the trip, topographically. The elevation of the spillway at Bowersock Dam is 812 feet. During the 1951 flood the water here was ten feet deep and stretched from bluff to bluff, nearly reaching the second floor of Johnny's Tavern (perhaps inducing a young Jim McCauley's lifelong fear of water). The river here is actually impounded by the Bowersock Dam to form a small, nameless lake. This nearly still water is a good site for the water intakes that remove water from the river for Lawrence's municipal supply. Johnson County and the city of Topeka have weirs in the Kansas River that temporarily impound water for their water intakes.

The river water is just a fraction of the fresh water that is in the Kansas River valley. During the Pleistocene Epoch, the Kansas River carved a deep trough into the bedrock, which today is filled with alluvium--clay, silt, sand, and gravel. This alluvium is saturated with water and represents the major fresh water resource in northeast Kansas. The wells here in Burcham Park tap this water supply for municipal use. These wells are 45 to 50 feet deep, which is the thickness of the alluvium in this part of the valley. The thickest alluvium in this section of the river is in the northern part of the floodplain and is 80 to 90 feet thick. The deepest part of the alluvial valley is actually a trench that meanders down the Kansas River valley independent of the course of the modern-day river. Where the modern river crosses this buried trench, it is over the thickest section of alluvium. Generally the thickest alluvium is somewhere other than directly below the river.

(0.4)

4.6 Leave Burcham Park heading south a short distance to Third Street. Turn west (right) going past the Lawrence Municipal Water Works, which gets water from the wells and intakes located in Burcham Park. Clinton Lake on the Wakarusa River west of Lawrence provides the city with additional water.

(0.2)

4.8 Maine Street. Turn south (left)

on Maine Street, past Lawrence Memorial Hospital.

(0.4)

5.2 Sixth Street. Turn west (right).

(0.6)

5.8 Here the street climbs up on the escarpment of the Oread Limestone, of which Mount Oread is a part. This road cut is in the Toronto limestone, named after a small town in southeastern Kansas. The Plattsmouth limestone is at the top of the roadcut.

(0.1)

5.9 Traffic light at Sixth and Iowa streets. Continue west.

(0.2)

6.1 Here the street completes its climb onto the Oread escarpment, passing through a roadcut in the Plattsmouth Limestone Member of the Oread Limestone. The elevation here is 1,000 feet, more than 180 feet above Burcham Park.

(1.0)

7.1 Traffic light at Sixth and Kasold, which is also County Road 438. Turn north (right), traveling down off the Oread escarpment. This route is called the River Road because it hugs the south bank of the Kansas River from Lawrence to Topeka.

(1.6)

8.7 Pass over the Kansas Turnpike (Interstate 70).

(0.3)

9.0 Turn west (left) at the stop sign.

(0.5)

9.5 Turn north (right) on County Road 7.

(0.4)

9.9 Here the road passes over the edge of the Buck Creek Terrace (see Fig. 3). This terrace represents alluvial deposits laid down by the Kansas River during the second-to-the-last of the glacial periods, the Illinoian. This glacier occurred after the Kansan glaciation, which covered northeastern Kansas; the Illinoian did not reach Kansas, but the Kansas River obviously flowed at a higher level during this time, creating these terrace deposits. The lower level on which the road continues to the north is the present-day

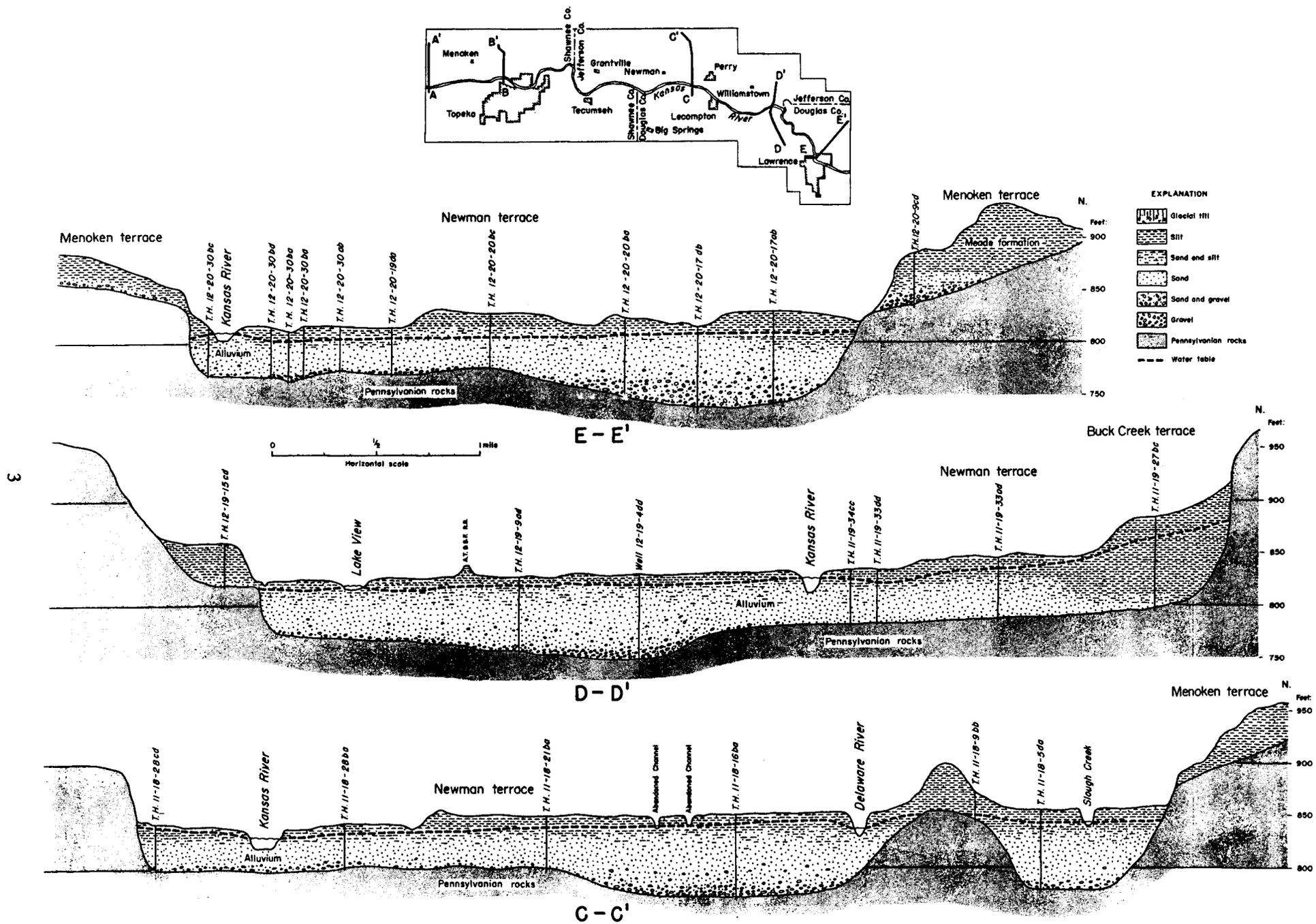


Figure 3. Geologic Cross Sections - Kansas River Valley (from Davis and Carlson, 1952)

floodplain of the Kansas River, with an elevation of about 830 feet.

(0.3)

10.2 Baldwin Creek.

(0.1)

10.3 Turn west (left) onto Road 1876N.

(0.2)

10.5 Turn north (right) and cross Lake View Lake. This is an oxbow lake that was once part of a meander loop in the Kansas River. But about 110 years ago, the Kaw took a short cut to the north, abandoning this bend of the river as a shallow, U-shaped lake. The water level in this lake closely reflects the level of the groundwater in the alluvium of the Kansas River. The only natural lakes in Kansas are either oxbows, such as this, or water-filled depressions formed by the underground dissolution of soluble rocks, such as salt, in central and western Kansas. Before the construction of human-made lakes, natural lakes, such as Lake View, were important recreation areas. A private club has owned this lake for nearly 100 years. Oxbows are usually short-lived lakes, their demise being silt, which washes in from runoff and floods and eventually fills the basins. This lake must be dredged to maintain a satisfactory water depth.

(0.5)

11.0 Crossing of the Atchison, Topeka & Santa Fe Railroad, now the Santa Fe Burlington Northern. The siding is named Lake View. This is the same railroad crossed at the entry to Burcham Park and is used by Amtrak's Southwest Chief, which makes daily runs between Los Angeles and Chicago.

(0.3)

11.3 Turn west (left) on 1950N Road.

(0.5)

11.8 A center-pivot irrigation system is north of the road. This is a long sprinkler on wheels that slowly circles and irrigates the field with groundwater, which is pumped from the alluvium under pressure. This water pressure is used to propel the wheels and rotate the sprinkler. Systems like this are much more common on the High Plains of western Kansas, where they pump water from the Ogallala Formation. In eastern Kansas, precipitation averages about 35 inches per year, and sprinklers are used during short dry

periods or droughts. Large, dependable aquifers are required for these systems, and in eastern Kansas, such aquifers are restricted to the major alluvial valleys.

(0.3)

12.1 Here the road passes the west end of Lake View Lake. This portion of the lake has silted in and only contains water when the water table is very high.

(0.2)

12.3 Turn north (right).

(0.5)

12.8 Turn west (left) on 2000N Road.

(0.3)

13.1 End of pavement. To the north is the beginning of the levee on the south side of the Kansas River. It was built to protect Lawrence from floods. This stretch of the river from Lawrence to Topeka has never been dredged; it is also one of the most heavily floated portions of the river. Proposals to dredge this stretch of the river have pitted sand and gravel companies against canoeists and environmentalists and have prompted much of the study and debate concerning the uses of the Kansas River.

(1.0)

14.1 Railroad crossing. Elevation 841 feet.

(1.8)

15.9 Oakley Creek.

(0.4)

16.3 Here the road climbs up out of the floodplain and passes an exposure of the Plattsmouth limestone. This unit caps much of Mount Oread at an elevation of 1,000 feet or more. Here the elevation is about 880 feet, the result of a gentle westward dip of the surface bedrock in eastern Kansas, where rocks generally dip west-northwest, away from the Ozark Dome.

(0.5)

16.8 After passing the Kanwaka Shale (which isn't exposed here) the road crests a hill capped by the Lecompton Limestone. The Lecompton ranges from 30 to 66 feet in thickness.

(0.1)

16.9 Turn north (right) on 650E Road.

(0.1)
17.0 Turn west (left) on East 7th Street.

(0.4)
17.4 Stop sign and junction with Douglas County Road 1023 and 600E Road. Go north (right). This is the Eisenhower Memorial Drive, named in honor of the centennial of Ike's birth and the fact that his parents met while attending Lane University in Lecompton.

(0.4)
17.8 Turn west (left) and enter Lecompton. An abandoned quarry in the Oread Limestone is just to the northeast. Lecompton was once known as Bald Eagle, because of the profusion of the birds that lived along the Kansas River in this area. Today, in the winter, bald eagles commonly roost in the trees in this area, feeding in the open waters that are created where the Delaware River flows into the Kansas River.

Lecompton was a hot bed of pro-slavery sentiment during the territorial days of Kansas history, and was for a brief time the territorial capital of Kansas. Construction began on a capitol in 1855. In the fall of 1857, a convention met in Constitution Hall and drafted the Lecompton Constitution that would have admitted Kansas to the Union as a slave state, thus igniting intense national debates. Later antislavery factions took control and the capital was moved to Topeka. Constitution Hall is a national historical landmark today.

(0.3)
18.1 Lane University. This college was founded in 1854 by the United Brethren; the building was constructed on the foundation of the old territorial capital. In 1903 the school was moved to Holton and renamed Campbell College.

(0.5)
18.6 At the edge of this hill capped by the Lecompton Limestone is an exposure of the Spring Branch limestone, the lowest member of the Lecompton Limestone. The Spring Branch is five to 14 feet thick, and single-celled, wheat-shaped fossils called fusulinids are abundant in many of its outcrops.

(0.3)
18.9 Coon Creek.

(0.2)
19.1 Crossroads. The River Road goes north on 500E Road.

(1.0)
20.1 Turn west (left) on 2190 Road, just past the Christmas tree farm, and climb about 50 feet above the Kansas River floodplain.

(0.8)
20.9 Turn north (right).

(0.1)
21.0 Cross the railroad tracks and turn west (left).

(1.9)
22.9 The center-pivot system north of the road is used to irrigate thirsty crops such as corn. A Broadway lyric boasts of being "corny as Kansas in August," although several states produce more corn than Kansas. Only northeast Kansas is considered part of the Corn Belt. Much of the corn here is grown in the rich bottom lands along streams. Some of the most productive corn-raising counties in Kansas are in the western part of the state, where irrigation makes it possible to grow corn that is mostly used as livestock feed.

(0.2)
23.1 Turn south (left), crossing the railroad tracks. There was once a siding here called Grover. Turn west (right) shortly after crossing the tracks. The small sign here designates this as the Kansas Capitols trail, connecting Topeka and Lecompton sites of the present and former capitols.

(0.5)
23.6 Spring Creek. One-hundred Spring creeks appear on Kansas topographic maps, including three in Douglas County alone. It is the most popular stream name in Kansas. This Spring Creek has its source in springs near the small town of Big Springs on a ridge three miles south. These springs were a watering spot on the Oregon Trail, which followed that ridge from Lawrence to Topeka.

(0.4)
24.0 Greenwood Valley Road leads south from here.

(0.5)
24.5 The road climbs up out of the floodplain past exposures of Lecompton Limestone. These limestones cap the hills in and around Lecompton five miles east of here and are more than 100 feet above river level. Here they are about 50 feet above the river. The uppermost limestone is named the Beil and is

noted for the large number of invertebrate fossils it contains, representing the marine life that existed in the shallow Pennsylvanian seas. These fossils include corals, crinoids, brachiopods, and fusulinids.

(0.6)

25.1 The road curves into a small valley, past additional exposures of limestones in the Lecompton Limestone.

(0.7)

25.8 Here the gravel turns to pavement as we cross from Douglas to Shawnee County.

(0.5)

26.3 Herschel Road. Elevation 854 feet. Turn north (right), traveling across the Kansas River floodplain to the Mike Meier farm.

(1.0)

27.3 **STOP 2. Kansas River.** This is a sandbar on the Mike Meier farm. Mr. Meier has recovered several large buffalo skulls and other fossils from this sandbar. From here, backtrack to the River Road and continue west.

(1.0)

28.3 River Road.

(1.5)

29.8 Whetstone Creek.

(1.0)

30.8 UCB Films plant. This plant manufactures thin plastic wrap.

(0.4)

31.2 Tecumseh Power Plant.

(0.5)

31.7 Tecumseh Creek.

(0.5)

32.2 To the south is the town of Tecumseh and to the north is the present-day mouth of Shunganunga Creek. Shunganunga is believed to be the corruption of an Indian word referring to a small horse. Shunganunga Creek has been channelized and redirected. Its natural mouth was about 1.5 miles northwest of here. Tecumseh is, of course, named for the Shawnee Indian chief. Tecumseh is the oldest town in Shawnee County and was the county seat from 1855 to 1858.

(0.1)

32.3 Stinson Creek, named for the founder of Tecumseh, Kansas.

(1.0)

33.3 Kansas Highway 4 overpass.

(0.4)

33.7 Abandoned sand pits north of the road.

(0.1)

33.8 Croco Road. Turn south (left).

(0.5)

34.3 Croco Road and U.S. Highway 40.

(0.8)

35.1 21st Street. Turn west (right) and continue west.

(0.6)

35.7 Take the I-70 West entrance to I-70 and continue west.

The entries for the following section of this guidebook are keyed according to milepost markers and are from Roadside Kansas (Buchanan and McCauley, 1987).

365.0 Deer Creek, which is dammed 1.5 miles to the south to form Lake Shawnee. The Deer Creek Limestone is named after exposures along this stream.

363.2 Topeka Limestone.

362.9 Shunganunga Creek.

362.5 Tenth Avenue exit. The Kansas Statehouse and other state office building are accessible from this exit. Construction on the Kansas Statehouse began in 1867, using Fort Riley limestone, quarried near Junction City. Construction on the west wing began in 1869, using Cottonwood limestone, dug near Cottonwood Falls in Chase County. Located on a 20-acre square in the center of Topeka, the Statehouse features murals by John Stuart Curry on its second floor.

Since Kansas was organized as a territory in 1854, the legislature has met at four locations in addition to Topeka. The 1855 legislature, called the Bogus Legislature because many of its members were elected by proslavery Missourians, met at Pawnee in Fort Riley and at Shawnee Mission. Later legislatures met at Lecompton and Lawrence,

before Topeka was voted the permanent state capital.

361.4 The twin spires of St. Joseph's Catholic Church are visible south of the highway. Topeka is the childhood home of Survey staff members Larry Brady and Andrea Yewell.

359.6 Here I-70 crosses Ward Creek, which flows a short distance north and empties into the Kansas River.

359.0 MacVicar Avenue, exit 359. Exit I-70 and turn north (right) at the stop sign.

STOP 3. Victory Sand and Gravel. Here we will visit a dredging operation on the Kansas River. The Kansas River is an ideal source of sand in northeast Kansas. Its primary use is as an aggregate in concrete construction: foundations, sidewalks, highways, sewers, bridges, etc. The ten counties that touch on the Kansas River contain nearly one million people, or 40% of the population in the state. Six of the ten largest cities in Kansas are in these ten counties and 97% of the population growth between 1980 and 1990 in the state can be accounted for in this ten-county area.

The bedrock of the Kansas valley contains numerous limestones that can be broken up and used for some construction needs. However, deposits of good, coarse sand are lacking. The glacial deposits of northeast Kansas contain some supplies of sand, though these are discontinuous and poorly sorted, contain unusable material of various sizes. The sand in Kansas River valley is the best source of sand used in today's construction. This sand is acquired by two types of dredging: dredging in the river itself and dredging in pits located on the floodplain of the river. Several river dredges operate in the river, and this dredge at Topeka is the farthest upstream. Above Topeka there are three pit dredges on the Kansas River floodplain: one near Wamego and two near Manhattan. In addition, a pit dredge operates on the Smoky Hill River floodplain near Junction City, just above the confluence of the Smoky Hill and Republican rivers, where the Kansas River begins.

One disadvantage of pit dredges is that they are located on the floodplain some distance from the channel of the river. Floodplain deposits--sediment deposited from suspension by floodwaters--are generally finer

than channel deposits and flood deposits left adjacent to the channel. As a result, there is a layer of fine, undesirable material--silt and clay--on the floodplain that is considered overburden, which must be removed to reach coarser, more desired deposits below. In general, this overburden is thinner in the upper portions of the Kansas River valley than below Topeka. Thus, there are more pit dredges above Topeka and more river dredges below.

After Stop 3, return to I-70 and proceed west to Wanamaker Road (exit 356).

358.3 Just north of I-70 is a view of the Kansas River. This is also the westbound exit for Gage Boulevard. One mile south is Gage Park and the Topeka Zoo, which is noted for its tropical rain forest and its gorilla exhibit.

358.0 Interchange for U.S. 75, which exits to the north and joins I-70 for a short distance to the west. The eastbound exit for Gage Boulevard and Gage Park is at this interchange.

357.1 On the hill to the north is Cedar Crest, the official residence of the governor of Kansas.

356.6 North of I-70 is the Menninger Foundation, a nationally known center for the treatment of and research into psychiatric disorders. The main building, which is modeled after Independence Hall in Philadelphia, contains a collection of Sigmund Freud's papers.

356.1 Exit for Wanamaker Road and U.S. Highway 75 By-pass South (exit 356). Turn south (left) and proceed to the Golden Corral for lunch. The Kansas Museum of History and the Menninger Foundation are accessible from this exit. The Kansas Museum of History, operated by the State Historical Society, opened in 1984 with exhibits related to the history of Kansas.

LUNCH STOP. Golden Corral. This lunch stop does not constitute an endorsement of the Golden Corral by the Kansas Geological Survey or its staff.

After lunch, return to I-70 via I-470 and proceed west.

355.2 I-470 and I-70 interchange.

354.4 Burlingame Limestone Member of the

Bern Limestone. Fusulinid and algal fossil remains are common in this limestone layer, which ranges in thickness from 1 to 25 feet.

353.1 Kansas Highway 4 interchange. This highway cuts through the Flint Hills south of I-70.

352.8 Auburn Shale, overlain by the Emporia Limestone.

352.4 Emporia Limestone.

351.4 Blacksmith Creek, a small creek that joins Mission Creek and drains into the Kansas River.

351.3 Here the road passes through a hill called Hickory Knob. Along the road, the Scranton Shale is overlain by the Bern Limestone.

350.8 Mission Creek.

349.5 Willard Shale.

349.1 Zeandale Limestone, which was named for a small town east of Manhattan. Zea is the Greek word for grain, and that part of the Kansas River valley was known as Zeandale Bottoms.

348.8 Zeandale Limestone.

348.4 Willard Shale, overlain by Zeandale Limestone.

348.0 Vassar Creek.

347.3 Willard Shale overlain by the Tarkio Limestone Member of the Zeandale Limestone. This Pennsylvanian limestone is gray, but it weathers to a deep yellow-brown. It is characterized by an abundance of large fusulinids.

346.0 Wabaunsee/Shawnee county line. Wabaunsee County was named for a Potawatomi chief whose name meant "Dawn of Day." This area was once part of a 900-square-mile Potawatomi reservation that stretched 30 miles north and west from Topeka. A 120-square-mile Potawatomi reservation still exists about 15 miles to the north, in Jackson County. The Potawatomi language provided what is probably the best-known Indian phrase in America--"kemo sabé"--which means faithful

friend and was used by television's Tonto in reference to the Lone Ranger.

345.4 Post Creek.

344.4 Dover Limestone Member of the Stotler Limestone.

342.2 Pillsbury Shale, overlain by the Stotler Limestone. In places, the Pillsbury Shale contains a thin bed of coal.

342.0 Keene Road. Taken south, this road intersects with K-4, which meanders through the Flint Hills. K-4 passes through Eskridge--a town that bills itself as the Gateway to the Flint Hills--and past a pretty human-made reservoir called Lake Wabaunsee. Buffalo Mound is clearly visible on the western horizon. At 1,273 feet elevation, this hill is more than 300 feet above Mill Creek valley, just to the north. It was reportedly named because its shape resembles a buffalo's back. Geologists consider Buffalo Mound a landmark on the eastern edge of the Flint Hills. It is capped by Grenola Limestone, the uppermost Pennsylvanian Formation in Kansas, and its outcrops are good locations for collecting fusulinid fossils.

341.0 Exit I-70. Turn north (right) at the stop sign on Kansas Highway 30.

Reset your odometer at the stop sign on Kansas Highway 30.

0.5 Mill Creek. The elevation of the creek here is 920 feet, 350 feet below the summit of Buffalo Mound, which looms on the horizon two miles to the west.

(0.7)

1.2 Santa Fe tracks. This was once the route of the Rock Island Railroad before its assimilation by the Santa Fe. Cross the tracks, then turn right and continue east on Kansas Highway 30. To the northwest is Maple Hill Church, which was heavily damaged by a tornado several years ago. The hill to the north is capped by the Brownville limestone.

(0.7)

1.9 Kansas Highway 30 ends. Turn left on Main Street in Maple Hill and proceed north.

(0.5)

2.4 Stop sign. Turn right (east).

(0.3)
2.7 Curve north.

(2.2)
4.9 Edge of the Buck Creek Terrace.

(0.1)
5.0 Kansas River. In this area the floodplain is about 4.5 miles wide, and stays this wide for about 20 miles upstream from Rossville to near Wamego. By contrast, the floodplain below Eudora is less than 1.5 miles wide, and in some places, less than one mile wide. Again, as at Lawrence, the river is at the south side of the floodplain, but the deepest part of the alluvial valley is four miles to the north near the north valley wall.

(1.7)
6.7 Here the road imperceptibly climbs onto the Newman Terrace. The Newman Terrace is more recent than the Buck Creek Terrace having formed at the end of the Wisconsin glacialiation, the most recent glacial advance that ended about 11,000 years ago.

(0.9)
7.6 Stop Sign. Turn west (left) on 62nd Road.

(0.5)
8.1 Enter Pottawatomie County.

(0.7)
8.8 Drop off the Newman Terrace onto the modern floodplain.

(0.4)
9.2 Curve to the north. The field in this corner is recently planted winter wheat. In most years, Kansas grows more wheat than any other state, resulting in its nickname of "The Wheat State." Nearly all the wheat is winter wheat, planted in the fall and grown through the winter. Cattle are often pastured on wheat fields during the winter. Rapid growth occurs in the spring, when the wheat develops kernels, or "heads out." The kernels are allowed to dry out somewhat before harvesting in the early summer.

(1.7)
10.9 Climb back onto the Newman Terrace.

(0.3)
11.2 Stop sign. Turn west (left) on U.S. Highway 24.

(0.3)
11.5 To the north is St. Marys Academy and College run by a sect of conservative Catholics who still use the Latin mass. This was once the site of Saint Marys Mission to the Potawatomi, a mission that relocated here in the mid-1800s along with the Potawatomi Indians from Linn County. This was at one time a seminary run by the Jesuits. The large chapel now in ruins was built in 1909 and destroyed by fire in 1978.

(0.4)
11.9 Immaculate Conception Catholic Church is to the south. Made of native limestone, it is run by more conventional Catholics who say the mass in English.

(0.3)
12.2 Junction with Kansas Highway 63. Elevation 955 feet. Turn north (right). To the left is Bayer Stone Company, which we will visit following our next stop.

(1.6)
13.8 The fence to the left is made of Fencepost Limestone from the Greenhorn Limestone of north-central Kansas. These fenceposts have been hauled in and are human-made erratics since there are no Greenhorn outcrops in this area. The crest of this hill is capped by the Grenola Limestone.

(0.6)
14.4 Rocks in the Red Eagle Limestone are in a road cut at the crest of this hill.

(2.5)
16.9 Bourbonais Creek named for Francois Bourbonnais who settled along this creek.

(0.4)
17.3 Entrance to Jeffrey Energy Center. Turn west (left). We have climbed onto rocks of the Permian Period that are partially covered by glacial deposits. Look for large boulders of Souix Quartzite, which are glacial erratics carried here by the Kansan glacier from outcrops near Souix Falls, South Dakota. This road also crosses the Military Trail connecting Fort Riley and Fort Leavenworth.

(1.5)
18.8 Road curves to the north. To the south is a quarry in the Cottonwood Limestone Member of the Beattie Limestone. This limestone is used for crushed stone aggregate and also building stone.

(0.5)
19.3 Curve west.

(1.5)
20.8 STOP 4. Jeffrey Energy Center. This plant sits on a ridge capped by the Funston Limestone that is mantled with till left by the Kansan glaciation. The Funston is one of the limestones utilized by the Bayer Stone Company, our next stop. Our elevation here is 1320 feet, 500 feet higher than Burcham Park. The coal burned here comes from Wyoming, not Kansas. Large amounts of water used for cooling come from the Kansas River.

After touring the Jeffrey Energy Center, backtrack to St. Marys and stop at the Bayer Stone Company at the intersection of U.S. Highway 63 and the Union Pacific Railroad just north of U.S. Highway 24 in St. Marys.

STOP 5. Bayer Stone Company. Bayer Stone Company makes building stone using limestone from the Funston Limestone, the Americus Limestone Member of the Foraker Limestone Formation, and the Cottonwood limestone (mined near Strong City, Kansas, in Chase County).

Return to Topeka following U.S. Highway 24. The following portion of the log uses mileposts along the highway beginning with 344 at the junction of Kansas Highway 63 and U.S. Highway 24.

344.0 Junction of U.S. Highway 24 and Kansas Highway 63. Turn east (left) on U.S. Highway 24.

344.5 College Creek. Just to the north on the banks of this creek is the Indian Pay Station Museum that preserves artifacts from the days in the 1850s and 1860s when this area was part of a large Potawatomi Indian Reservation. Today, a much smaller reservation still exists north of Topeka near Mayetta.

345.0 Maple Hill Road.

346.1 Enter Shawnee County.

346.9 Bourbonais Creek. After crossing the creek, we climb onto the Newman Terrace. Much of U.S. Highway 24's route from here to Topeka traverses the Newman Terrace. The Kansas River seems to prefer the south side of the valley, not only here, but throughout much

of its course. This may be due to the asymmetrical nature of the Kansas River drainage basin. Most of the large tributaries enter from the north. The sediment they deliver to the river valley is dumped when they enter the floodplain, building it up and forcing the river to the south.

349.0 Buffalo Mound is visible on the horizon to the south almost eight miles distant.

350.0 Peanaz Hill is north of the highway.

351.3 Cross Creek and the west edge of Rossville. Cross Creek is a floodprone stream that has inundated parts of Rossville on numerous occasions. Rossville is named for William W. Ross, one-time Indian agent to the Potawatomis and mayor of Topeka. He was the brother of Edmund G. Ross, Kansas Senator, who cast the deciding vote against impeaching President Andrew Johnson, Abraham Lincoln's successor.

353.1 The highway drops down into a meander scar, a former bend occupied by the river sometime before white settlement in this area.

354.5 The east end of the meander scar seen at 353.1. The former channel of the Kansas River is now occupied by Ensign Creek, which flows southeast and empties into Silver Lake 2.5 miles to the southeast.

357.0 Enter the town of Silver Lake, named for the oxbow lake on the southwest edge of town. This is the hometown of Lonnie Kruger, former Kansas State University basketball player and coach who now coaches at the University of Illinois.

357.6 Silver Lake is just west of the road beyond a line of trees.

358.0 East edge of the town of Silver Lake.

361.0 This place is known as Kiro.

361.8 Broadcasting facilities for KSNT-TV channel 27, the home of "Seinfeld" every Thursday night featuring Kramer.

363.2 This low area is another abandoned Kansas River channel and also the location of Menoken, a wye on the Union Pacific Railroad where a branch heads off to the northwest eventually joining the mainline of

the Union Pacific near Kearney, Nebraska. Menoken is also the name given to the oldest terrace deposits along the Kansas River. Located high on the valley walls, the Menoken Terrace was deposited several hundred thousand years ago following the Kansan glaciation. To the south on a hill capped by the Bern Limestone is the Menninger Foundation.

364.6 This is the site of an old Indian Treaty boundary that marks the east edge of the former Potawatomi Reservation.

364.8 U.S. Highway 75 interchange.

365.7 Abandoned river channel.

366.7 Goodyear Tire and Rubber.

367.3 South of the road is an abandoned sand pit in the Kansas River floodplain. When these operations cease, a large hole is left in the alluvium that is difficult and costly to fill. These pits are dug below the water table and fill with groundwater. The surface of the water in these pits represents the water table in this area.

368.1 Soldier Creek. Like Shunganunga Creek south of the Kansas River, Soldier Creek has been diverted into a human-made channel. Its natural channel crosses the highway and meanders through North Topeka, emptying into the Kansas River one mile southeast of here.

368.2 Topeka Avenue. This is the former U.S. Highway 75, which has been re-routed 3.5 miles to the west.

370.2 Soldier Creek. This is the human-made diversion of Soldier Creek, which skirts along the north edge of the floodplain and empties into the Kansas River just south of here. Soldier Creek most likely got its name from the soldiers who camped along its banks while traveling the Military Trail between Fort Riley and Fort Leavenworth.

370.5 East Topeka City Limit. To the east, U.S. Highway 24 climbs out of the floodplain onto Calhoun Bluff. This is the type locality of the Calhoun Shale, which crops out on the lower slopes of the bluff. Overlying the Calhoun Shale is the Topeka Limestone, which is exposed in the roadcuts at the Kansas Highway 4 - U.S. Highway 75 interchange.

STOP 6. Calhoun Bluff. Take the Kansas Highway 4 south exit from U.S. Highway 75 and stop at the large roadcut. This section of rock includes the upper part of the Calhoun Shale, which includes a thin coal and a nearly complete section of the Topeka Limestone. Good fossil-collecting horizons exist in the limy shales adjacent to the limestone units. Table 1, attached to the end of this roadlog, provides a geologic description of this roadcut.

Following Stop 6, reset the odometer and continue south on Kansas Highway 4.

(0.2)

0.2 At the base of the bluff is Indian Creek.

(0.8)

1.0 Kansas River.

(0.2)

1.2 A pit dredging operation is visible east of the highway. Numerous abandoned sand pits exist in this area northeast of Topeka.

(0.6)

1.8 Billard Municipal Airport is to the west. This is the home of the Topeka office of the National Weather Service, which prepares forecasts for northeast and east-central Kansas.

(0.6)

2.4 The old natural channel of Shunganunga Creek.

(0.6)

3.0 Santa Fe-Burlington Railroad and human-made Shunganunga Creek.

(0.6)

3.6 Stoplight. U.S. Highway 40. Turn east (left).

(0.6)

4.2 Stinson Creek.

(0.9)

5.1 Tecumseh Creek. Like the town, this creek is named for the famous Shawnee chief.

(1.8)

6.9 Whetstone Creek.

(0.5)

7.4 Limestones in the Deer Creek Limestone.

(1.0)

8.4 As the road curves to the east, ruts of the Oregon Trail are visible just south of the road. U.S. Highway 40 and the Oregon Trail share this drainage divide between the Kansas River to the north and Wakarusa River to the south, crossing at several locations.

(1.2)

9.6 Curve to the south passing through a roadcut in the Topeka Limestone.

(0.8)

10.4 Kansas Turnpike overpass and roadcut in the Topeka Limestone. The highway enters Douglas County at this point.

(0.4)

10.8 The north entrance to the Big Springs Limestone Quarry where the Deer Creek Limestone is mined.

(0.6)

11.4 Big Springs. This was a watering spot on the Oregon Trail. East of here, U.S. Highway 40 follows a narrow ridge capped by the Deer Creek Limestone that separates the Kansas River and the Wakarusa River drainages.

(5.2)

16.6 Here the highway drops off the Deer Creek Limestone escarpment onto slopes developed in the Tecumseh Shale and continues east on uplands underlain by the Lecompton Limestone.

(0.3)

16.9 Eisenhower Memorial Drive (Douglas County Road 1023) leads north to Lecompton. A Sioux Quartzite boulder in the roadside park at this intersection marks this locale as Coon Point, which in 1842, was a campground on the Oregon Trail. The roadside historical marker is a fairly new addition, replacing an older marker that was considered historically misleading. It proclaimed Lecompton as the slave capital, when, in fact, slavery never existed in Kansas. The new sign better explains the history of Lecompton as the territorial capital and the political fight over Kansas being a slave state or a free state.

(2.2)

19.1 This bend in the highway is an area known as Kanwaka. Although never an organized town, this is an old settlement and gives its name to the surrounding township.

Kanwaka gets its name from the Kansas and Wakarusa rivers. It sits on the divide between the two drainage basins. It was in this area that Thomas W. Barber, a Free Stater originally from Ohio, was murdered by armed horsemen. This marked the end of passive resistance on the part of the Free Staters. As one Free Stater proclaimed, "War has begun." The Bleeding Kansas period of the state's history began. The murder of Barber inspired John Greenleaf Whittier to write a poem in his honor. Barber is also remembered by the Barber Schoolhouse two miles south of here on 700E Road. This school is being restored by staff and students in KU's School of Architecture and Urban Design. Barber County, visited during the KGS Staff Field Trip in 1992, is also named for Thomas W. Barber.

(1.9)

21.0 Kansas Highway 10 interchange.

(1.0)

22.0 Here the road descends the escarpment capped by the Lecompton Limestone and passes through slopes formed in the Kanwaka Shale, and continues on uplands underlain by the next oldest limestone, the Oread.

(0.5)

22.5 Wakarusa Drive, turn south (right).

(1.0)

23.5 15th Street, turn east (left).

(0.3)

23.8 Small exposure of the Plattsmouth limestone.

(0.9)

25.7 Crestline Drive, turn south (right). The road climbs back onto Mount Oread and the Oread Limestone.

(0.8)

26.5 KGS parking lot, end of trip.

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Table 1. Calhoun Bluff - Geologic Description of the Topeka Limestone and Calhoun Shale (from Johnson and Adkison, 1967)

[Along U.S. Highway 24 in the N½S½ sec. 14, T. 11 S., R. 16 E., Shawnee County]

Till.

Topeka Limestone :

Coal Creek Limestone Member : *Feet*

Limestone, light-olive-gray, silty; weather to nodular beds less than 0.2 ft thick; interbeds less than 0.05 ft thick of light-olive-gray calcareous siltstone; member capped by hard limestone bed 0.6 ft thick, underlain by siltstone bed 0.6 ft thick that contains a few limestone lenses; USGS fossil loc. 19447-PC (f12996)----- 4.4

Holt Shale Member :

Siltstone, dark-gray, laminated; weathers to medium-dark-gray fissile fragments; upper contact slightly irregular; rhomboporoid bryozoans, brachiopods (cf. *Crurithyris*), conodonts(?); identifications by E. L. Yochelson (written commun. 1960)----- 2.1

Du Bois Limestone Member :

Limestone, medium-dark-gray, very finely crystalline, hard, compact; weathers to light-olive-gray to light-yellowish-gray vertically jointed bed; abundant brachiopods and gastropods-- 0.8

Turner Creek Shale Member :

Siltstone, light-olive-gray; pelecypods----- 0.4
 Limestone, light-olive-gray, very finely crystalline; weathers to hard light-olive-gray bed; brachiopods, productid spines, gastropods----- .2
 Siltstone, light-olive-gray, slightly sandy, platy----- .5
 Limestone, medium-gray, very fine grained, hard; weathers medium light gray to light olive gray; abundant brachiopods, productid spines, and gastropods----- .1
 Siltstone, light-olive-gray, slightly sandy; fossil fragments----- .5
 Limestone, medium-dark-gray, hard; abundant very small pyrite and limestone pellets; very abundant fossil fragments----- .1
 Siltstone, medium-light-gray, slightly sandy, platy; weathers light olive gray; scattered shell fragments----- 1.1

Thickness of Turner Creek Shale Member----- 2.9

Sheldon Limestone Member :

Limestone, light-gray to light-olive-gray; weathers light olive gray to very light yellowish brown; silty in lower 0.9 ft; forms ledge; base is generally poorly exposed; very small fossil fragments----- 3.5

Jones Point Shale Member :

Claystone, olive-gray, silty to very finely sandy; weathers light olive gray; micaceous on bedding planes----- 2.7

Table 1 (continued)

Topeka Limestone—Continued	
Curzon Limestone Member :	<i>Feet</i>
Limestone, light-yellowish-brown to olive-gray, very finely crystalline, hard; weathers to moderate-yellowish-brown vertically jointed bed; scattered <i>Osagia</i> , fusulinids, echinoid spines, fenestrate and ramose bryozoans, <i>Linoproductus</i> and other brachiopods, high-spined gastropods (aff. " <i>Murchisonia</i> "); identifications by E. L. Yochelson (written commun. 1960)-----	1.2
Limestone, light-olive-gray, silty; interbedded with light-olive-gray claystone; limestone weathers to thin irregular beds and lenses; fusulinids (USGS colln. f12998), crinoid plate and stem fragments, echinoid spines, rhomboporoid, ramose, and fenestrate bryozoans, <i>Derbyia</i> , <i>Chonetes granulifer</i> Owen, <i>Neospirifer dunbart</i> R. H. King, and <i>Composita subtilita</i> (Hall); identifications by E. L. Yochelson (written commun., 1960)-----	1.8
Limestone, medium-light-gray, very finely crystalline, hard, compact, hackly; beds 0.4–1.3 ft thick; medium-light-gray silty limestone interbeds 0.3–0.5 ft thick; brownish-gray fossiliferous chert in irregular masses as much as 0.3 ft thick mainly in zone about 1 ft below top; some masses scattered in upper 2 ft; <i>Osagia</i> ?, fusulinids (USGS colln. f12997), crinoid stems, bryozoans, <i>Composita</i> -----	4.9
Thickness of Curzon Limestone Member-----	7.9
Iowa Point Shale Member :	
Claystone, medium-gray to olive-gray, silty, laminated, micaceous; weathers medium light gray; some shell fragments----	1.4
Hartford Limestone Member :	
Limestone, light-olive-gray, very finely crystalline; silty in upper half; weathers moderate yellowish brown; weathers to irregular blocks in upper 2.7 ft; single hard vertically jointed bed that has sharp edges and "cable markings" in lower 2.8 ft; upper contact gradational through about 0.1 ft of silty limestone; abundant fusulinids throughout (USGS colln. f12999); algae, crinoid stems, lophophyllidid corals, brachiopods, and possibly pelecypods in lower part-----	5.5
Siltstone, olive-gray, slightly sandy, laminated to platy; weathers light olive gray; crinoid columnals-----	.2
Limestone, light-olive-gray, very finely crystalline, hard; weathers yellowish gray to moderate yellowish brown; forms resistant ledge at base of Topeka; abundant fusulinids (USGS colln. f12995), crinoid columnals, echinoderm debris, bryozoans, brachiopods, and a high-spined gastropod-----	.5
Thickness of Hartford Limestone Member-----	6.2
Thickness of Topeka Limestone-----	31.9
Calhoun Shale :	
Siltstone, olive-gray, sandy; upper contact sharp-----	1.2
Coal, brownish-black, hard, brittle, hackly-----	.2
Clay, olive-gray; structureless-----	.1
Siltstone, medium-gray to olive-gray, sandy, laminated to platy, micaceous; weathers yellowish gray to light olive gray; base not exposed-----	4.0+
Thickness of exposed Calhoun Shale-----	5.5