ABSTRACT OF

"CLARIFICATION OF DESMOINESIAN STRATIGRAPHY IN THE PLEASANT HILL SYNCLINE OF THE CRINER HILLS"

By CHARLES LEE RAMAY*

The basic problem of this study was to determine whether strata of Dornick Hills age crop out in the Pleasant Hills syncline and around the north end of the Criner anticline. It was accomplished by faunal studies, detail mapping one or more strata, and associating adjacent strata on the basis of the above findings.

One fairly fossiliferous bed was found in the center of the syncline cropping out primarily in the southwest corner of Sec. 23, T-5S., R-1E, Carter County, Oklahoma. A detailed fusulinid study was made, and compared with fusulinids from established horizons in the Ardmore basin, especially in the stratigraphic interval between the upper Big Branch formation and the base of the Hoxbar. Also ostrocodal content and megascopic fossils were collected, classified and correlated from the subject bed and others.

Confirmation of stratigraphic location of the subject bed was made by detail surface mapping of the bed and a younger bed (Confederate limestone) throughout the Pleasant Hill syncline and around the northern end of the Criner anticline.

The subject bed most investigated was found to be the Camp Ground member of the Deese group and a complete faunal listing is made with four plates, complete bibliography; and two tables of measurements of *Fusulina eximia* Thompson.

A brief interpretation of the structural history of the area is given, and a resume of the stratigraphy pertaining to the general area of thesis work is included.

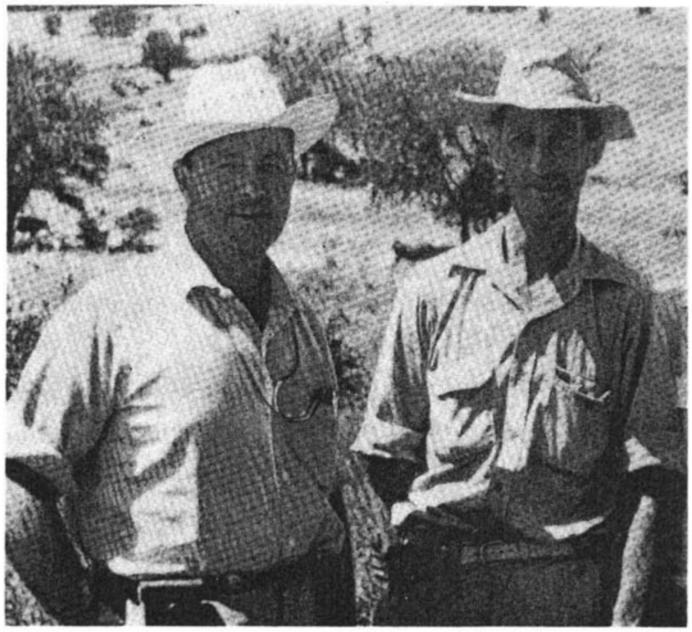
Conclusions were (a) In this type of study comparisons of fusulinid fauna encountered constitutes the best approach. (b) There were no rocks of Upper Dornick Hills (now Big Branch) age deposited over the Criner Hills. (c) The oldest rocks that covered the Criner Hills are probably middle Deese in age, with the possibility that lower Deese sediments may have been present. (d) There was rejuvenation along the Kirby fault zone probably in post-Hoxbar times. (e) The bed primarily investigated is the equivalent of the Camp Ground member of the Deese group. (f) A limestone unit cropping out in N½ SE NW Sec. 23, T-5S., R-1E., and traceable around the Pleasant Hill syncline, and the north end of the Criner anticline is the Williams member of the Hoxbar formation. (g) Another limestone unit traceable and parallel to the Williams and Confederate members is equivalent to the Natsy member of the Hoxbar group. (h) The westward thinning of the unnamed intervals in the northwestern corner of Sec. 26 and the southwestern corner of Sec. 23, T-5S., R-1E is essentially due to onlap and to a minor extent by compression from the northeast.

* Presently with Gulf Oil Corporation, Houston, Texas; written in partial fulfillment of the requirements for the degree of Master of Science from the Graduate College, University of Oklahoma 1957.

PUBLICATIONS OF THE ARDMORE GEOLOGICAL SOCIETY

1. The Pennsylvanian of the Ardmore Basin. March 15, 1936. (Out of Print)
2. The Pre-Pennsylvanian of the Ardmore Area. April 4, 1936. (Out of Print)
3. The Pennsylvanian System of the Ardmore Basin. (First Session) May 5, 1936. (Out of Print)
4. Ardmore to Wichita Mountains. April 18, 1936. (Out of Print)
5. Ardmore to the Ouachita Mountains. June 6, 1936. (Out of Print)
6. Study of the Pennsylvanian Outcrop of Palo Pinto, Parker, Eastland, Brown and Coleman Counties, Texas. December 5 and 6, 1936. (Out of Print)
7. The Hoxbar and Upper Deese Formations South of Ardmore. March 13, 1937. (Out of Print)
8. Study of Lower Pennsylvanian, Mississippian and Ordovician Formations on North and West sides of the Llano Uplift of Central Texas. April 9, 10, 11, 1937 (Out of Print)
9. Structure of the Criner Hills. May 15, 1937. (Out of Print)
10. Lower Pennsylvanian of the Berwyn and Baum Areas. April 23, 1938. (Out of Print)
11. Washita Valley Fault System and adjacent Structures. Northeast of Ardmore, Mississippian through Ordovician. Mimeograph, 14 pages including maps. (Out of Print)
12. A Structural and Stratigraphic Consideration of the Arbuckle Mountains and the Criner Hills. June 28, 29, 1946. (Out of Print)
13. Study of Pennsylvanian Formations, Ardmore Area, Oklahoma. June 18, 1948. North and South of Ardmore, Pennsylvanian Formations. (Out of Print)
14. Study of Structure and Stratigraphy in the Arbuckle Mountains, and Related Structures in Carter, Murray and Johnston Counties, Oklahoma, 1950. $2.00.
15. Study of Paleozoic Structure and Stratigraphy of the Arbuckle and Ouachita Mountains in Johnston and Atoka Counties, Oklahoma, 1952. (Out of Print)
16. Southern Part of the Oklahoma Coal Basin, 1954. $4.00.
17. Geology of the Arbuckle and Timbered Hills Group; and Regional Stratigraphy and Structure of the Arbuckle Mountains, 1955. In print, $4.00. Available from C. E. Branson, Oklahoma Geological Survey, Norman, Oklahoma.
18. Ouachita Mountain Field Conference, Southeastern Oklahoma. Geologic Map and Sections of the Core of the Ouachita Mountains, 1956. $6.50.
19. Southern Oklahoma Regional Cross Sections.
    - Scale #1 — $10.00 per set of four — $3.00 Each
    - Scale #2 — $ 7.50 per set of four — $2.50 Each
        - Scale #1 — vertical scale 1″ — 400′, horizontal scale 1″ — 4000′, approximate size of each cross section is 42″ x 60″.
        - Scale #2 — vertical scale 1″ — 800′, horizontal scale 1″ — 8000′, approximate size of each cross section is 21″ x 30″.
20. Membership Directory $1.50.
21. Criner Hills Field Conference, Southern Oklahoma. Geologic History as Shown in the Criner Hills, Geologic Map and Sections, 1957; paper bound $6.50, Cloth bound $8.00.

LEADERS OF THE 1957, "CRINER HILLS" FIELD CONFERENCE



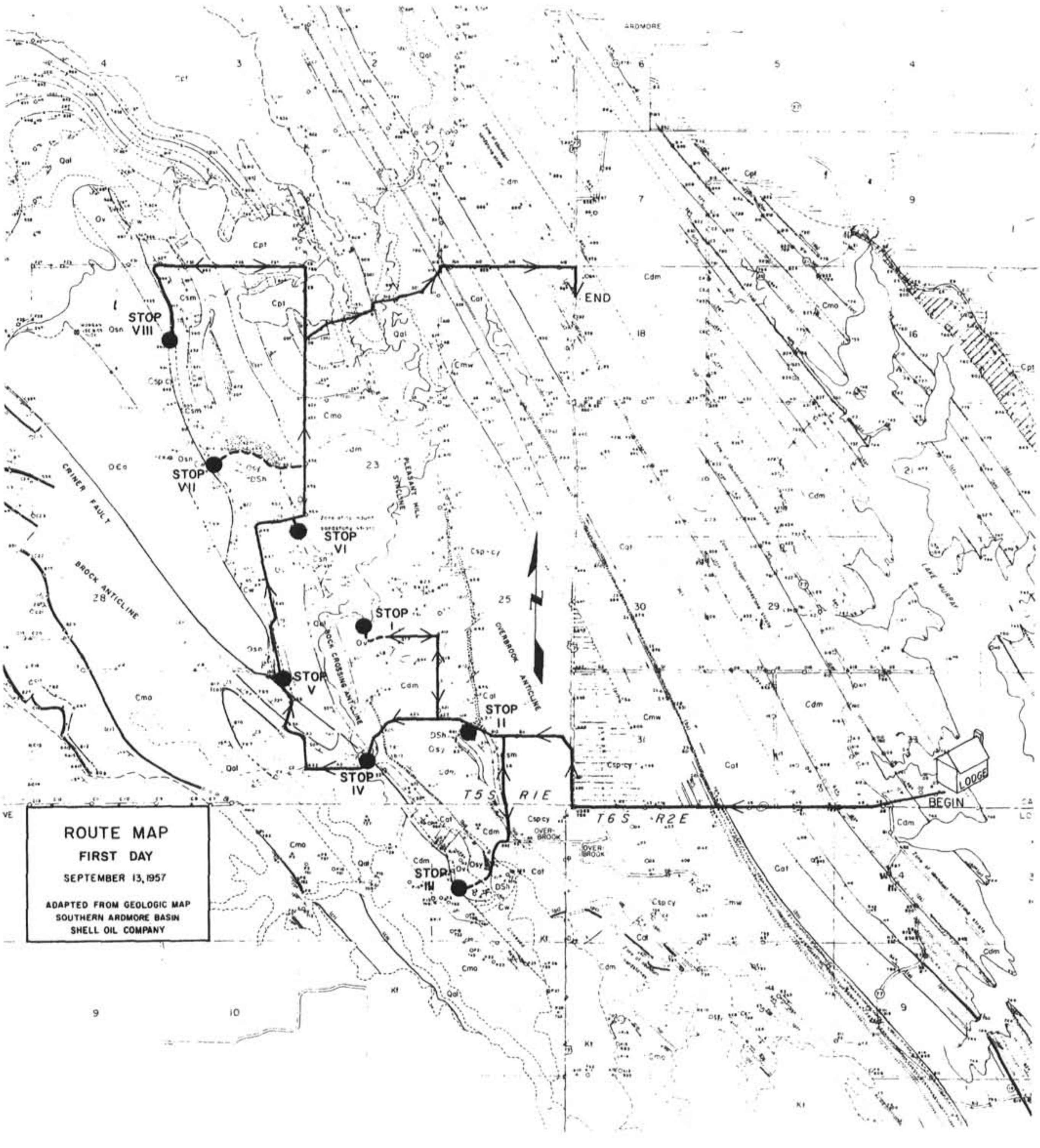
"Freddy" "Hugh"

Dr. E. A. Frederickson

Born	September 28, 1908, in Madison, Wisconsin
Education	University of Wisconsin, Predoctorate and Ph D—1942
Position	Professor—University of Oklahoma School of Geology
Specialty	Stratigraphy and the trilobites of the upper Cambrian
Duties	Teaches Paleontology; directs Summer Field Course in the Criner Hills and teaches Summer Field Course at Canon City, Colorado.

Dr. Hugh E. Hunter

Born	June 4, 1915, in the Province of Manitoba, Canada
Education	University of Manitoba—BS & MS; University of California at Berkeley, Ph D—1954
Position	Associate Professor—University of Oklahoma School of Geology
Specialty	Igneous Petrology
Duties	Teaches Petrology; teaches Summer Field Course in the Criner Hills and at Canon City, Colo.


ROUTE MAP
FIRST DAY
SEPTEMBER 13, 1957
ADAPTED FROM GEOLOGIC MAP
SOUTHERN ARDMORE BASIN
SHELL OIL COMPANY
STOP I
STOP II
STOP III
STOP IV
STOP V
STOP VI
STOP VII
STOP VIII
BEGIN
END
LODGE
CRINER FAULT
BROCK ANTICLINE
ROCK CROSSING ANTICLINE
PLEASANT HILL SYNCLINE
OVERBROOK ANTICLINE
OVERBROOK
LAKE MURRAY
ARDMORE
T5S R1E
T6S R2E

ROAD LOG

FIRST DAY OF CONFERENCE

FRIDAY, SEPTEMBER 13, 1957

PRE-PENNSYLVANIAN CORE OF CRINER HILLS

By

H. T. WEICHBRODT and JACK W. WILLIAMS

GEOLOGIC COMMENTS

By

DR. E. A. FREDERICKSON and DR. H. E. HUNTER

Assembly point for first day of field conference is the road leading west from the Lake Murray Lodge parking area. Tennis courts are to your left (south). Face west.

Starting Time 8:00 a.m. September 13, 1957

(Stop Numbers superposed on Route Map)

NOTE: Lake Murray Lodge is built upon the Rocky Point conglomerate member of the "Deese" formation, Deese group, Des Moinesian series, Pennsylvanian system.

Please Be Careful of Fires and Trash

MILEAGE:

Reference Points	Accumulative	
0.0		
0.4	(0.4)	Water tower on the right (north) is located on an excellent outcrop of the Arnold limestone member of the "Deese" formation. The crop trends northwest-southeast and is very fossiliferous.
0.1	(0.5)	Stop! Intersection of Highway 77-Scenic. Continue straight ahead (west).
0.1	(0.6)	Massive sandstone crossing road—unnamed—within the "Deese" formation.
0.3	(0.9)	Ridge of Devil's Kitchen sandstone member, "Deese" formation. The dip is to the northeast with the upper part very sandy, getting more conglomeratic toward the base. Going along strike southeastward little more than a mile the sandstones become very conglomeratic. Note drag folding in the sandstones at this crop. The limestones and shales are quite fossiliferous.
0.4	(1.3)	Low ridge developed on Pumpkin Creek limestone member of the Big Branch formation, Dornick Hills group.
0.5	(1.8)	Prominent ridge of Bostwick conglomerate member of the Lake Murray formation, Dornick Hills group. This crop has thin limes and shales becoming sandy and conglomeratic toward the base. Note at the right toward the base of the member that the conglomerate bed does not carry across the road to the left. Rapid lensing seems quite common. Good fossil zones are in this crop. The well on the right (north) is the Gulf Oil Corporation #1 Riner which produces gas from a Goddard sandstone. For structural interpretation, see Lang's and Williams' cross section.
0.5	(2.3)	Ridge of sandstone in upper part of Springer group.
0.3	(2.6)	Massive ridge of Overbrook sandstone member of Springer group. Note the red shales within the crop.
0.1	(2.7)	Caution! Railroad crossing.
0.3	(3.0)	Intersection with Highway 77, turn right (north) and continue. We are crossing Goddard shales.

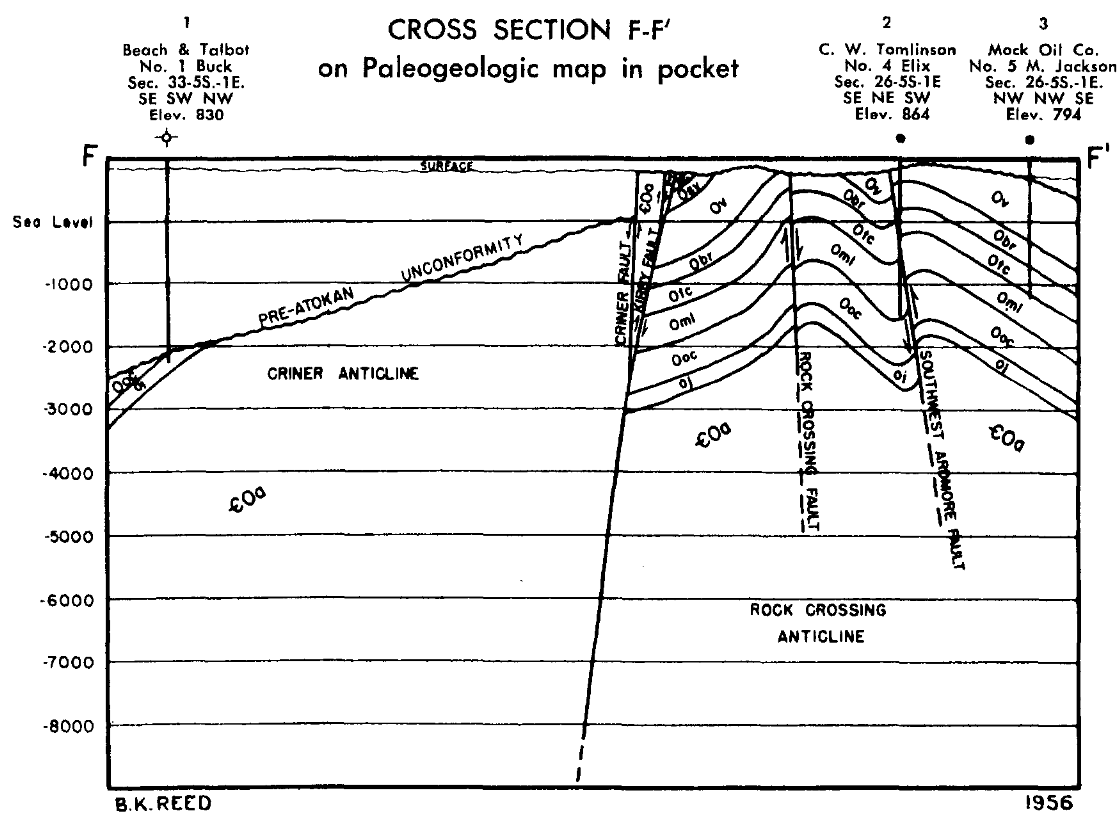
MILEAGE:

Reference Points	Accumulative	
0.4	(3.4)	Intersection, turn left (west) and continue on gravel road—still on Goddard shales.
0.6	(4.0)	Ridge to the south is Sycamore limestone formation of Osagean series of Mississippian system. Road bears right.
0.2	(4.2)	Woodford quarry to left (south), cemetery to right. Note wells to west of quarry producing primarily from McLish sand of the Simpson group.
0.3	(4.5)	Intersection, turn right (north) on section line road. We are proceeding northward on the Pleasant Hill syncline.
0.6	(5.1)	Intersection, turn left (west) on lease road—cross cattle guard and proceed west across center of north plunging Pleasant Hill syncline. Deese beds are exposed here.
0.3	(5.4)	Base of Viola group, Cincinnatian (?) series, Ordovician system. We are crossing a dip slope of Viola.
0.2	(5.6)	Tank battery to right.
0.1	(5.7)	STOP I — EAST FLANK ROCK CROSSING ANTICLINE — (Discussion by FREDERICKSON)

Viola strata exposed dipping east. Note well in saddle on hill. Dip of Viola beds decreases abruptly in saddle near well to form a structural terrace, thus increasing the breadth of the outcrop. Dip increases again and east side of the hill is essentially a dip slope. The abrupt decrease in dip may represent the surface expression of the Southwest Ardmore fault. The well in the foreground is producing from sands in the Simpson group. (See Reed's cross section, this page.)

Northward from this stop, the Rock Crossing anticline rather abruptly narrows, partially as a result of faulting. The anticline is cut by the Rock Crossing fault which roughly parallels the axis.

The structural terrace which is so prominent in the east limb of the Rock Crossing anticline continues



northward in subsurface to form a northward-plunging anticline paralleling the surface expression of the Rock Crossing anticline. Reflection of this buried anticline is shown in the broad northward curve of the Deese and Hoxbar beds on the Pleasant Hill syncline which is superimposed upon the older structure. The Southwest Ardmore pool produces from Simpson sands in this buried anticline.

At this stop there will be a discussion of the general structural picture of the Criner Hills, and a brief description of the Southwest Ardmore oil pool by Carl Hale.

Retrace route to main gravel road (north-south) at cattle guard.

MILEAGE:

Reference Points	Accumu-lative	
0.6	(6.3)	Junction of lease road at cattle guard with main north-south gravel road. Turn right (south).
0.6	(6.9)	Turn left (east) on gravel road.
0.2	(7.1)	STOP II — WOODFORD QUARRY — (Discussion by HUNTER)

The Woodford quarry is about 1¼ miles southeast of the tank battery on the Viola ridge (Stop 1), approximately along the strike of the formations. Hunton limestone is exposed along the west side of the quarry, and Sycamore limestone on the high ridge to the east. These formations dip to the northeast and are on the east limb of the Rock Crossing anticline. A fault may extend approximately parallel to the road near the north edge of the quarry, and may account for the abrupt truncation of the north end of the Sycamore ridge. The block south of the fault may have been upthrown, resulting in the apparent displacement of the east-dipping formations to the east. A northwest-trending fault lies in the valley to the west of the quarry, and may be the surface expression of the Southwest Ardmore fault discussed at Stop 1.

The lithologic character and weathering characteristics of the Woodford chert is well illustrated in this exposure, although the shale facies is poorly developed. Secondary structures such as minor folds and faults that form in the incompetent Woodford beds are exposed at several places, particularly to the west near the Hunton-Woodford contact. Fragments of Mississippian fossils have been collected from upper beds of the Woodford in this quarry.

Woodford Quarry

MILEAGE:

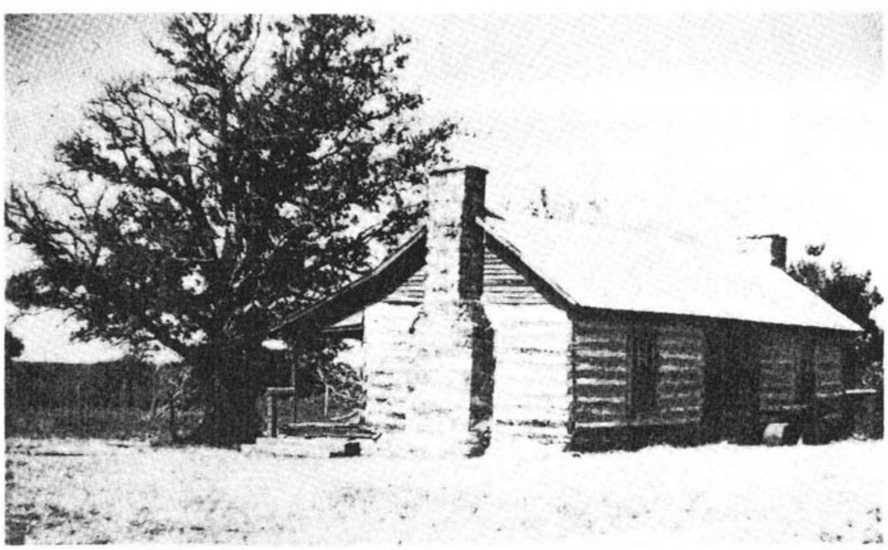
Reference Points	Accumulative	
		Continue straight ahead (east) on gravel road.
0.3	(7.4)	Intersection, turn right (south); to the west is the previously mentioned Sycamore limestone ridge. We are crossing Goddard shales.
0.7	(8.1)	Intersection—continue straight ahead. Indian assembly grounds on right.
0.1	(8.2)	Intersection. Turn right (west) on gravel road.
0.1	(8.3)	Gate—go through and continue on farm trail.
0.1	(8.4)	Road bears left (south) and now crosses the Hunton limestone group of Devonian-Silurian systems.
0.1	(8.5)	Valley ahead is Sylvan shale formation of Ordovician age. Hills in foreground are Viola limestone.
0.2	(8.7)	STOP III—CRINER-KIRBY FAULT SCARP AND ASSOCIATED STRUCTURES—(Discussion by WEICHBRODT)

At this point can be seen the fault scarp of the combined Criner and Kirby faults. The junction of the Criner and Kirby faults lies to the northwest and will be seen at Stop V this morning. The relationship, at this point, of the Criner-Kirby fault is a thrust to the southwest being upthrown to the east and dipping at approximately 50° northeast. A well to the southeast of here about 100′ (the A. W. Cherry #1 Bourland in NW NE NW SW, Section 1-6S-1E) spudded in Bromide formation (Simpson group) and at 200′ cut through the thrust into "Deese" formation beds, continuing in "Deese" formation to a total depth of 725′. A twin hole to the Cherry well, the Schermerhorn #1 Bourland crossed the fault in much the same fashion but continued to the pre-Pennsylvanian on the down side of the fault where it encountered eroded Arbuckle limestone. (See Reed's sequence of cross sections, immediately following.)

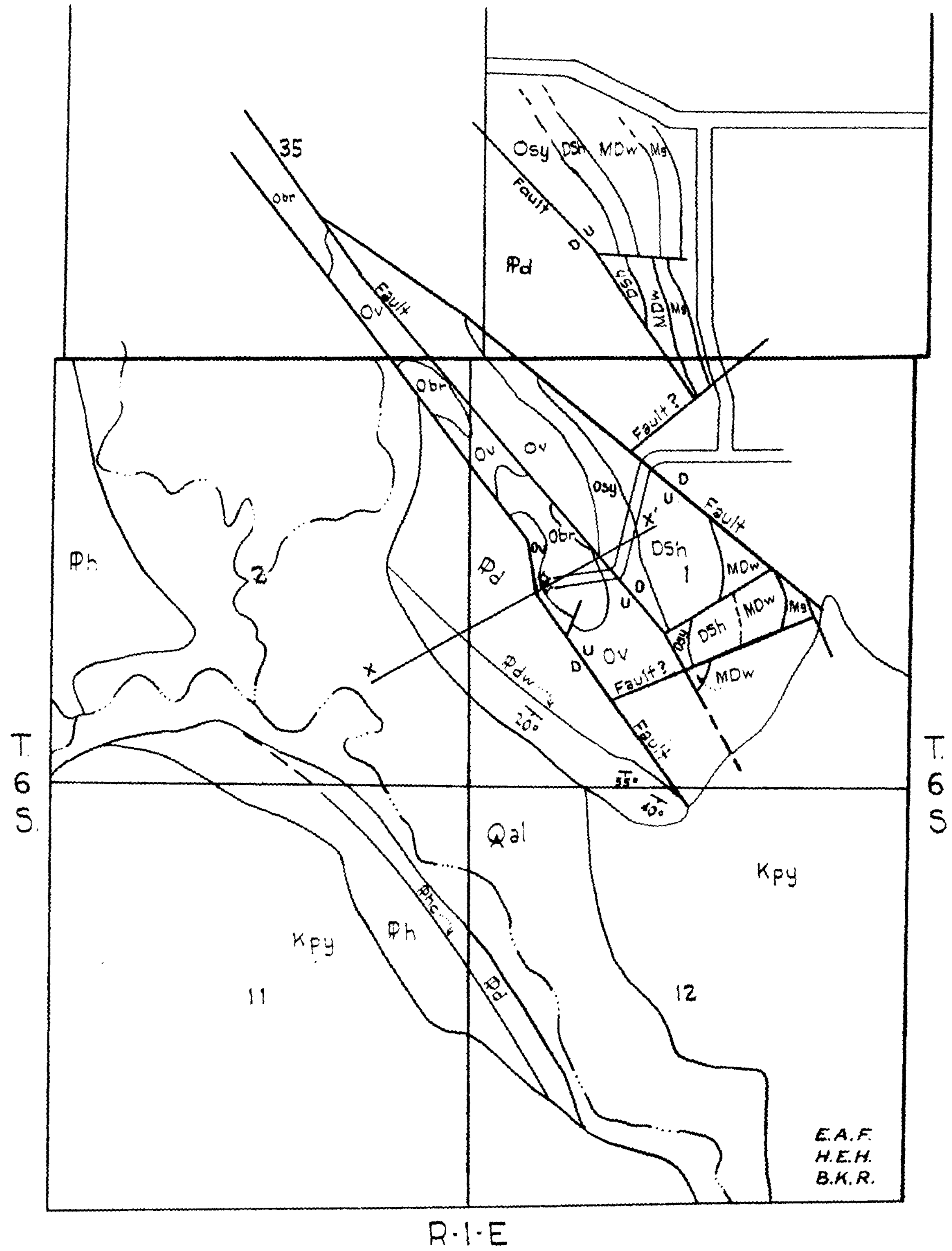
We are standing on about the Viola limestone-Bromide formation contact. Immediately to the southwest, on the slope, beds of Pennsylvanian ("Deese" formation) are exposed dipping southwest except where the beds became involved in fault drag. There, they are overturned. (See sketch map.)

By reference to the sketch and areal maps at this locale it can be seen that the pre-Pennsylvanian rocks exhibit a series of linear closing noses against the Criner-Kirby fault. This seems to represent the southeastward plunging of the Rock Crossing anticline, and is an integral part of the anticline.

In the Pennsylvanian beds on the downthrown side of the Criner-Kirby fault can be seen evidence of a small anticline tucked under the thrust which could represent the southeast plunging Brock anticline. (See sketch map.)

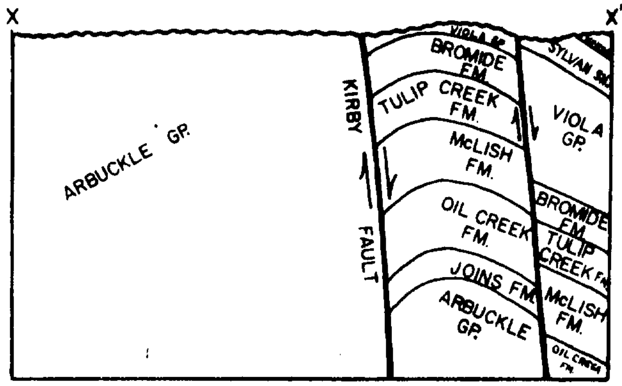


Bourland Ranch House, 1885—near Stop III

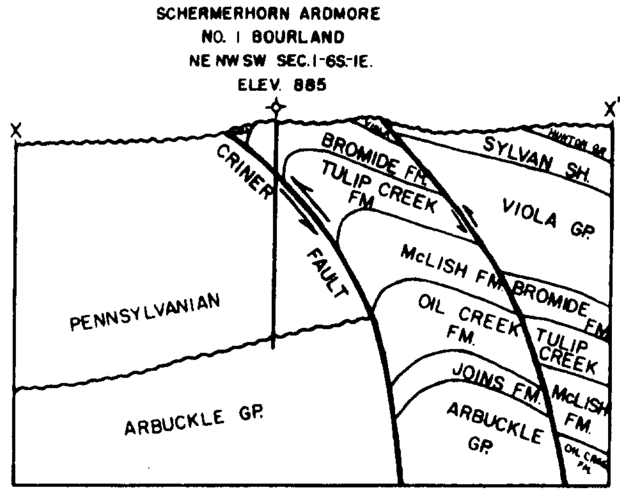


STOP NO. III

Sketch map of Criner-Kirby fault scarp & Rock Crossing anticline



GENERALIZED CROSS SECTION SHOWING KIRBY FAULT (DOWN-THROWN TO THE EAST) BEFORE ATOKAN DEPOSITION



GENERALIZED CROSS SECTION SHOWING PRESENT DAY GEOLOGY AND WHERE THE CRINER FAULT (DOWN-THROWN TO THE WEST) USED THE OLD KIRBY FAULT PLANE

B.K. REED 1956

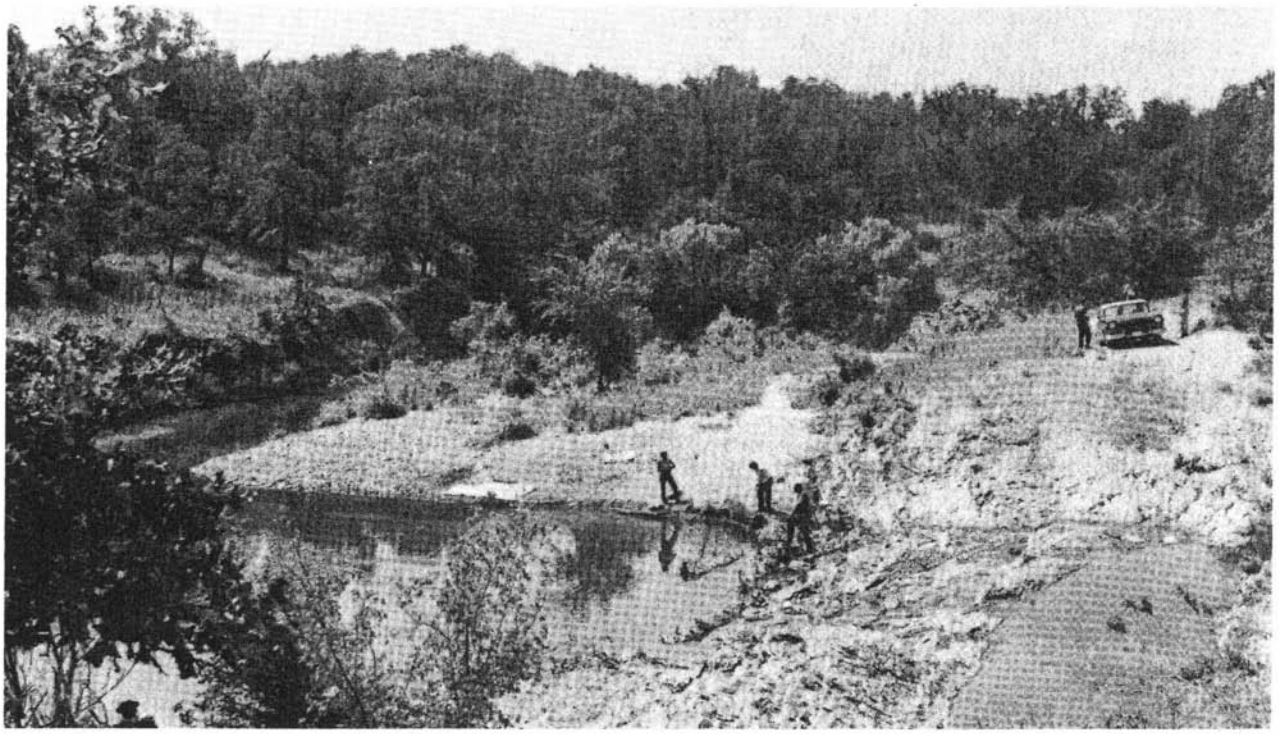
MILEAGE:

Reference Points	Accumulative	
		Retrace route back to Woodford quarry gate.
1.6	(10.3)	Gate to Woodford quarry—continue straight ahead (west).
0.2	(10.5)	Intersection—continue ahead (west).
0.5	(11.0)	Ranch buildings to the right sitting on Deese sediments on the west limb of the Pleasant Hill syncline.
0.2	(11.2)	Bridge over Hickory Creek—bear right.
0.2	(11.2)	STOP IV — ROCK CROSSING AREA — (Discussion by FREDERICKSON)

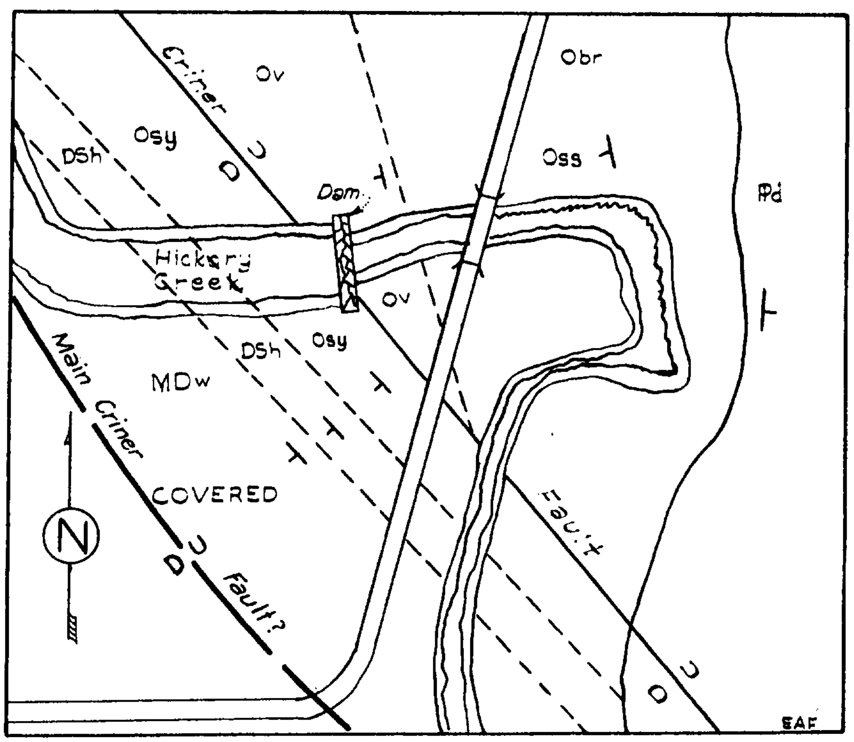
In this area the Criner fault has apparently split into two planes closely paralleling each other. Here they trend southeastward diagonally across the west limb of the Rock Crossing anticline. The junction of the Criner and Kirby faults which will be seen at Stop V is about one mile northwest. The main trace of the Criner fault (where Pennsylvanian beds are juxtaposed with pre-Pennsylvanian rocks) is just a few hundred feet to the southwest. The most easterly of the two fault planes cuts the Viola formation at its contact with the Bromide just south of the bridge, throwing the upper beds of the Sylvan shale into fault contact with the prow-shaped Viola remnant. Across Hickory Creek (see sketch) the Sylvan shale is in fault contact with the Bromide formation of the Simpson group (the Viola being completely faulted out).

Southward along the stream the resistant beds of the Chimney Hill formation of the Hunton group can be seen extending into the stream from the bank. A small outcrop of Woodford shale is sometimes visible (depending on stream conditions) above the Hunton beds.

Eastward from the bridge, the axis of the Rock Crossing anticline is exposed in beds of the Bromide formation (Simpson group) along a small tributary of Hickory Creek.



"Bromide 'Dense' member of the Simpson group"—southeast from bridge



STOP NO. IV

Sketch map of Rock Crossing area (alluvium omitted)

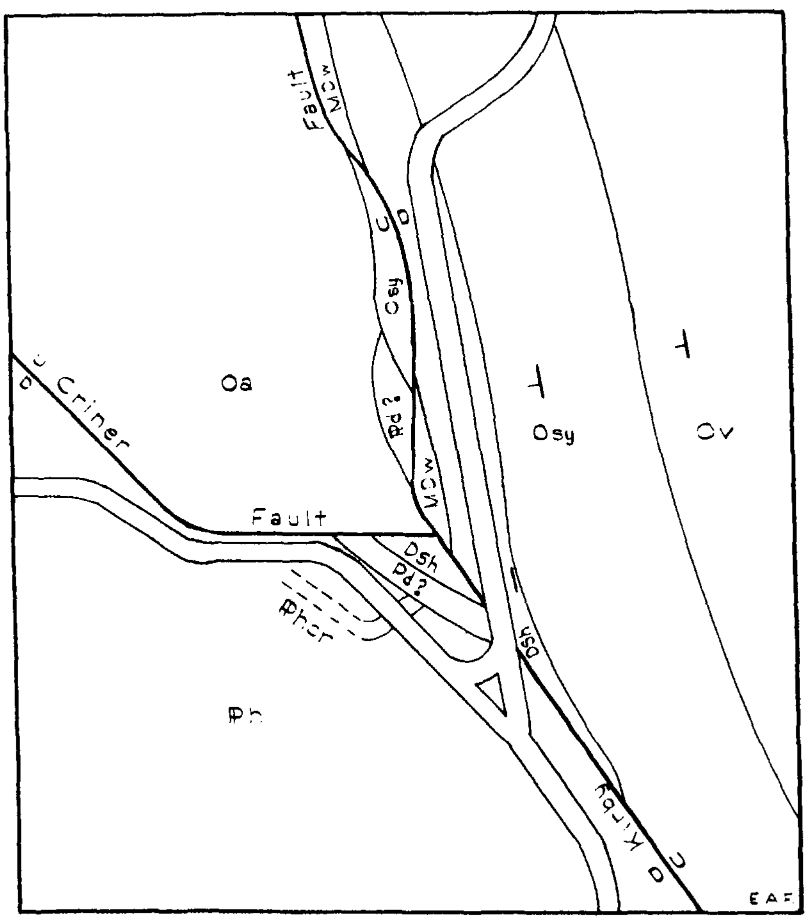
MILEAGE:

Reference Points	Accumu-lative	
		Proceed straight ahead southwestward, then west on only gravel road passing over sediments of the Deese group on the east limb of the Rock Crossing anticline.
0.6	(11.8)	Intersection, turn right (north) and proceed over Deese beds.
0.5	(12.3)	Low ridge is on Confederate limestone member, "Hoxbar" formation, Hoxbar group, Missourian series. This is the lowest member of the "Hoxbar" formation and is on the east limb of the Brock anticline.
0.3	(12.6)	Intersection—turn right and stop.

STOP V — JUNCTION OF KIRBY AND CRINER FAULTS —
(Discussion by FREDERICKSON)

The Kirby fault was the first of these two major faults to develop, forming as a result of tremendous compressive forces during the Criner-Wichita orogeny. The Kirby fault is a reverse fault. The Frankfort Oil Company No. 1 Royal, NW NE SW, Section 9-5S-1E, duplicated the Viola at depth, and Reed (O. U. Master's thesis) concluded that the dip of the fault plane at that well was 60° to the west.

The Kirby fault is a fault zone, as indicated by the large slices of Viola and Hunton rocks which have been dragged up in the fault northward along its trace. The very sinuous course of the Kirby fault suggests that the dip of the fault plane changes along the course of the fault.



STOP NO. V

Sketch map of junction of Kirby and Criner faults

The Criner fault was formed as a result of the Arbuckle orogeny and is linked with the formation of the Brock anticline and other late Pennsylvanian structures. Southward (Stop III) the Criner fault plane dips toward the older sediments (east) and is a high-angle reverse fault. Northward, drilling evidence indicates the fault is vertical or is dipping steeply towards the Pennsylvanian sediments (west) and there is therefore a normal fault in this area.

Here at the junction of the two faults, the Criner fault trace makes an abrupt turn eastward to join the Kirby fault, and apparently follows the trace of the Kirby fault southeastward. On the basis of subsurface evidence, Reed believes that two periods of movement occurred along the Kirby fault from the junction southward. According to Reed, the area east of the fault was downthrown during the Criner-Wichita orogeny and was upthrown during the Arbuckle orogeny.

MILEAGE:

Reference Points	Accumulative	
0.2	(12.8)	Crossing beds of upper Hunton.
0.2	(13.0)	Bear right, crossing Chimney Hill limestone formation of Hunton group.
0.1	(13.1)	Now crossing a valley of Sylvan shale.
0.05	(13.15)	Excellent exposure of the lower dolomitic phase of Sylvan shale in pit on right.
0.05	(13.2)	Road parallels contact of Sylvan shale and Viola limestone.
0.7	(13.9)	Bear right. Note the end of the Viola hill to the south (right). This exposure is a result of stream erosion, possibly along small transverse fault. Fernvale Viola crosses the road at bridge ahead.
0.2	(14.1)	Farm gate to right (south)—Stop.

STOP VI — MINNOW FARM AREA-ROCK CROSSING FAULT —
(Discussion by Hunter)

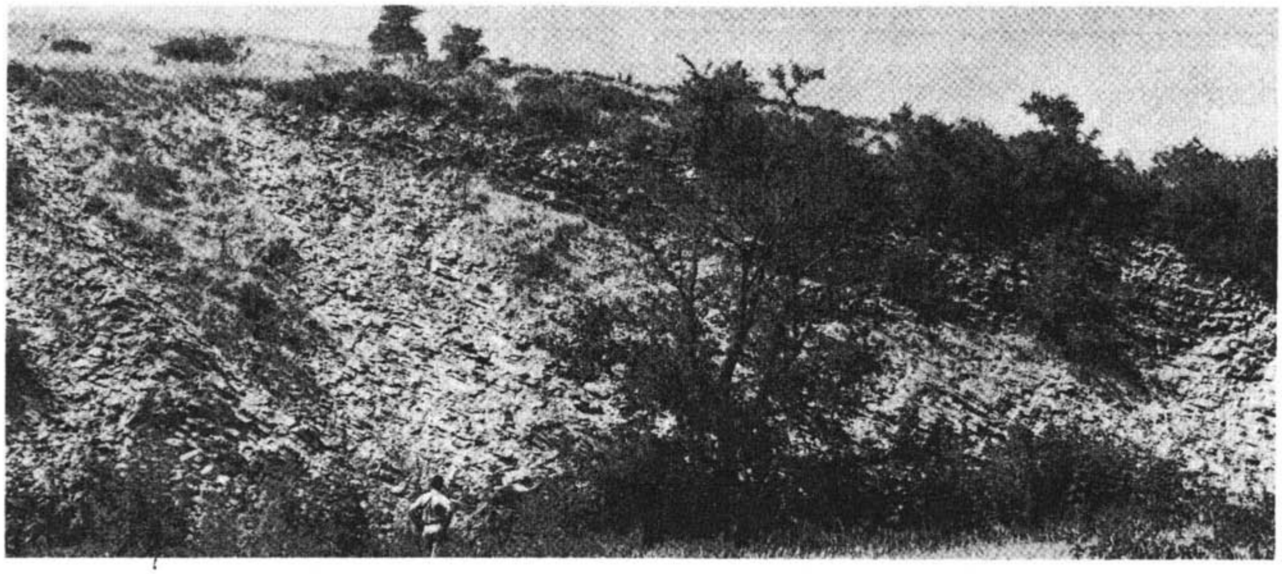
(This is LUNCH STOP. Food is prepared by The Ardmore Geologists' Wives Society. After lunch there will be a brief discussion and examination of the area.)

The Rock Crossing fault was first located by Tomlinson in subsurface in a well drilled in the Simpson valley north of Rock Crossing. The fault was discussed at Stop 1, and extends northward through the valley west of the Viola ridge on which that stop was made. The most definite surface evidence of the Rock Crossing fault is exposed at the present stop.

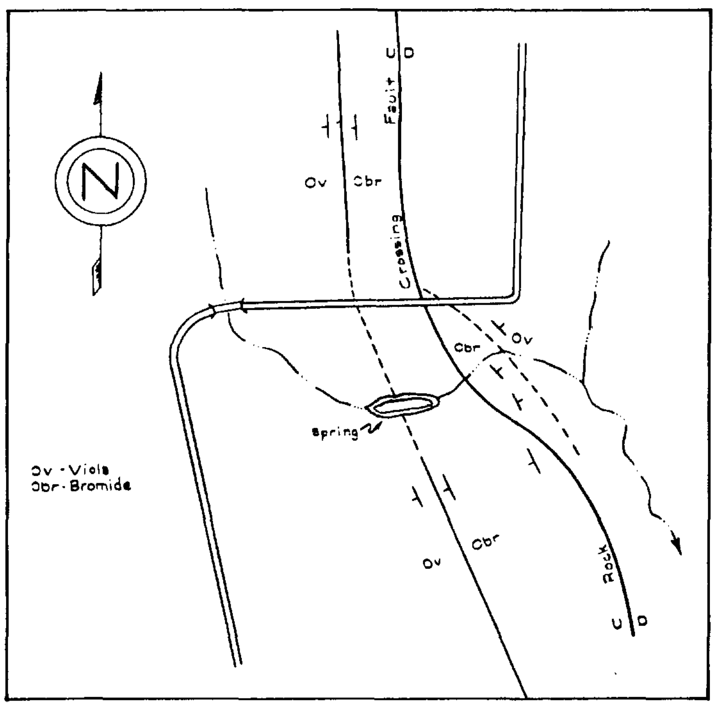
Immediately southwest of the spring, westward-dipping Viola and Simpson (Bromide) beds are exposed in a vertical stream cut. The Viola-Simpson contact lies in the rubble-filled valley east of the main ridge. Here the formations strike N 30° W, but just south of the road the strike changes rather abruptly to N-S. The abrupt truncation of the Viola ridge, and the apparent thinning of the Viola to the north are the result of stream erosion. Medium to coarsely crystalline beds of the upper part of the Bromide are exposed in the stream south of the spring. These Viola and Simpson beds are on the west flank of the Rock Crossing anticline.

Directly east of the spring, outcrops of Viola limestone and medium to coarsely-crystalline beds of the upper Bromide which are separated by about 200 feet of covered interval, strike N 50° W and dip steeply northeast. These beds form part of the northwest-plunging nose of a subsidiary fold on the east flank of the Rock Crossing anticline.

The Rock Crossing fault passes between the two outcrops of medium to coarsely-crystalline beds of the Bromide, passes just east of the spring and continues northwest past the buildings, and crosses the road just east of the gate. Here the strike of the fault changes to N-S, parallel to the strike of the Viola and Simpson beds on the west side of the fault. The Bromide beds exposed near the buildings north of the spring show extensive brecciation as a result of the fault. Surface evidence to the south indicates that the fault extends south through the stream valley. The east side of the fault has been faulted down with respect to the west side. The east block has been further cut by a series of E-W cross faults forming a series of fault blocks in the east limb of the Rock Crossing anticline.



Viola ls on west flank Rock Crossing anticline



STOP NO. VI

Sketch map showing surface evidence of the Rock-Crossing fault

MILEAGE:

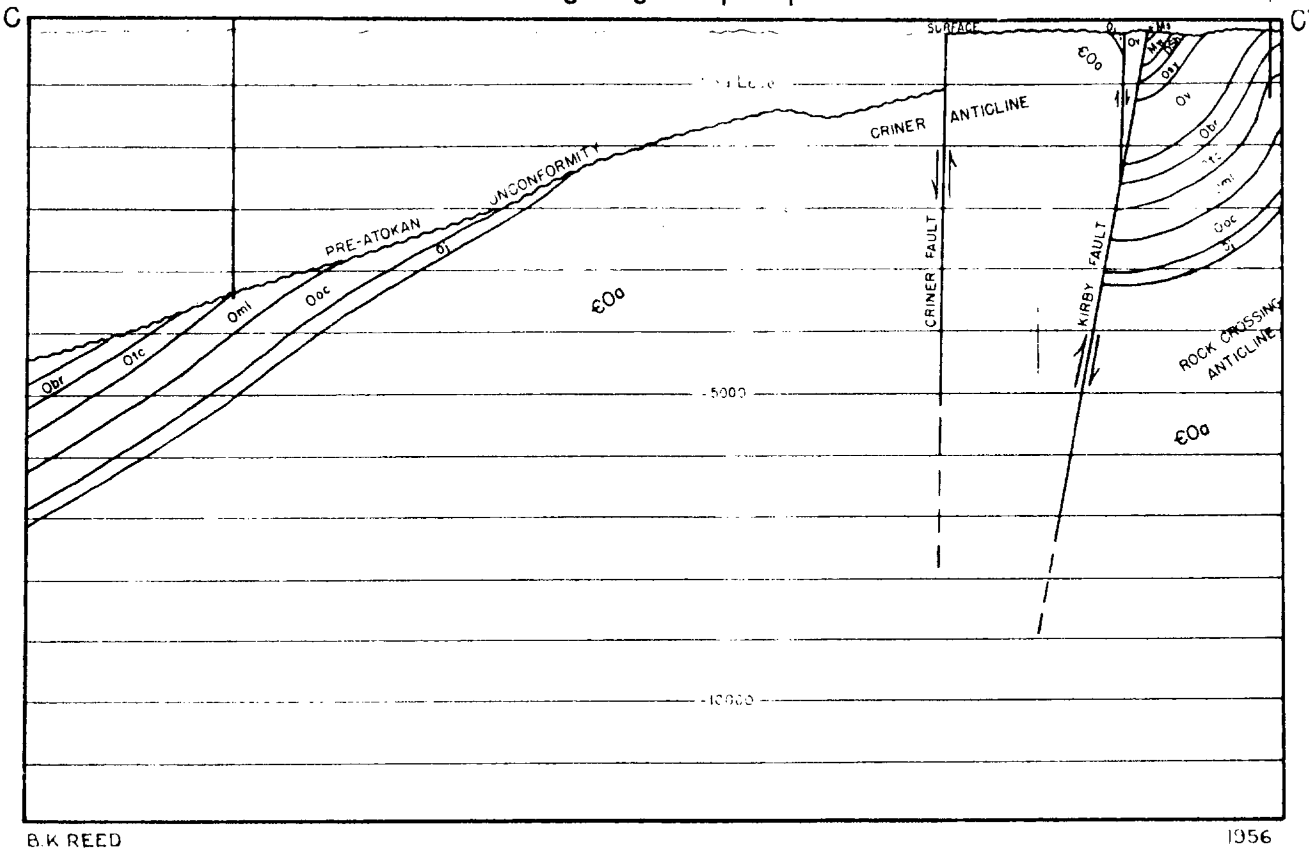
Reference Points	Accumulative	
0.2	(14.3)	Intersection, turn left (north) and continue. We are proceeding northward through the Pleasant Hill syncline on Deese beds. Low ridge to the right is Mr. Curtis Hicks' proposed Camp Ground member of the "Deese" formation.

Toklan Petroleum Co.
No. 1 'B' Carroll
Sec. 32-5S-1E
SW SW NW
Elev. 866

CROSS SECTION C-C'

on Paleogeologic map in pocket

H. E. Ledbetter
No. 1 Harris
Sec. 22-5S-1E
SW NE SE
Elev. 873



MILEAGE:

Reference Points	Accumulative	
0.3	(14.6)	STOP VII — CEMETERY SYNCLINE — (Discussion by HUNTER)

The Cemetery syncline lies between the Criner anticline to the west and the Rock Crossing anticline to the east. Most of the Cemetery syncline has been faulted out by the Kirby fault, and in this one area only are both limbs of the syncline preserved. The west limb of the syncline is preserved at this place because of the westward swing in the trace of the Kirby fault.

Proceed west along farm road to top of Viola ridge behind farm house. Here the Viola strikes northwest and dips to the southwest. Walk north along the ridge and observe the Deese* conglomerates that wrap around the nose of the Viola ridge. Proceed west around nose of hill to old trail and follow it to the west. Note how the Deese* conglomerate has filled the valley previously formed in the Sylvan shale. The Sylvan and Hunton formations are covered by the conglomerate along this route, but crop out along strike to the south. Continue west along trail; note Woodford in old quarry, its attitude concordant with that of Viola. Farther west on trail outcrops of Sycamore cross the road. The covered area west of the last Sycamore outcrop is underlain by Caney shale. Follow the trail around a 90° turn to the left (south) past stock shelters to outcrop in stream bed. Here nearly vertical Sycamore crops out in contact with Woodford to the west. These beds are on the west limb of the syncline, and the synclinal axis lies in the Caney valley between the two Sycamore outcrops.

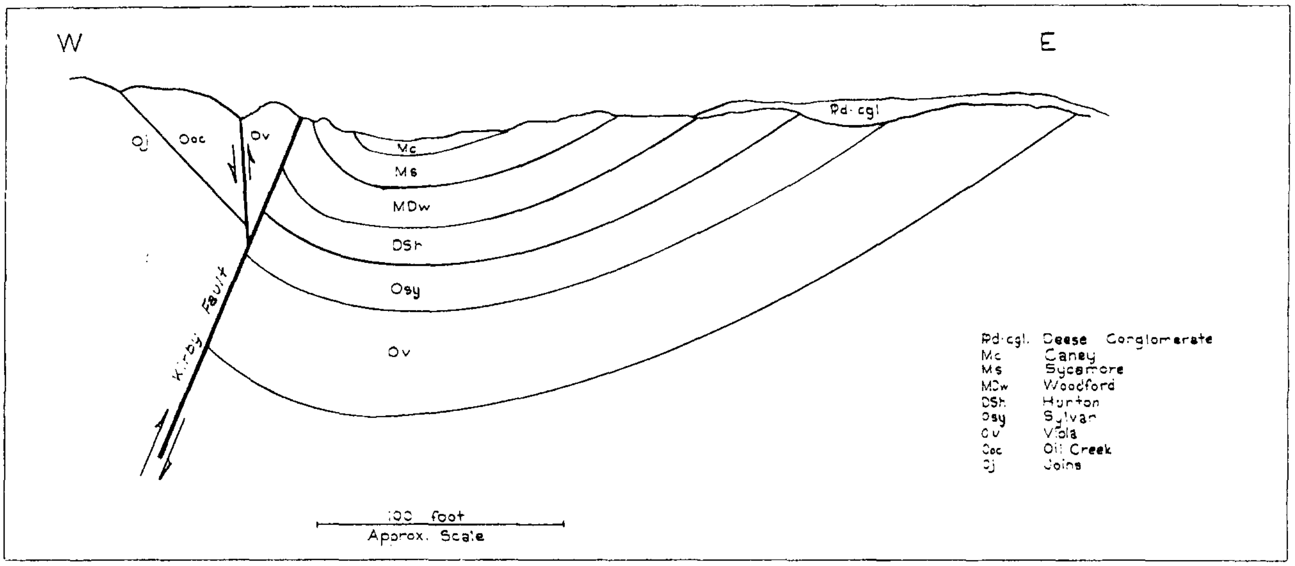
Continue west across the stream and up the slope to the top of the ridge. The rock underlying this ridge is Viola limestone, bordered to the east by Woodford and to the west by Oil Creek beds of the Simpson group. The Viola ridge is a fault slice (horse) dragged up along the Kirby fault zone.

* Formerly called "Bostwick". See Ramay's paper.

Retrace route to the east-west part of the trail. Follow the open area northwest to the ridge of outcrop. (The white-weathering, fragmented outcrops are fault blocks of Viola limestone.) The rock in the outcrop ridge is Birdseye limestone of Oil Creek formation (Simpson group). Contact with the overlying McLish lies immediately east of the ridge. (The Birdseye limestone seems to be the *upper* member of the Oil Creek in the Criner Hills.) The wedge shape of the outcrop results from truncation of the Birdseye ridge by the Kirby fault which trends along the east flank of the ridge, striking at an acute angle to the strike of the beds.

Retrace route to buses. (Immediately north of the west limit of the trail that was followed to this point lies an old cemetery with graves dating back to the 1880's.)

Continue straight ahead (north).



STOP NO. VII

East-West cross section—Cemetery syncline

MILEAGE:

Reference Points	Accumulative	
0.5	(15.1)	Road intersection on right. Continue straight ahead.
0.2	(15.3)	Low ridge extending to right (southeastward) is the upper unit of the Confederate limestone. The axis of the Pleasant Hill syncline passes just west of the farm buildings to the right.
0.2	(15.5)	Low ridge of Crinerville limestone trending northwestward on the west limb of the Pleasant Hill syncline.
0.05	(15.55)	Church to left. Continue ahead.
0.05	(15.6)	Intersection, continue straight ahead. Low ridge of Anadarche limestone trending northwest across road.
0.6	(16.2)	Intersection, turn left (west) and continue.
0.5	(16.7)	House to right is on Confederate limestone still on west limb of Pleasant Hill syncline. Note wells to the left producing primarily from the Tulip Creek sand of the Simpson group. This pool is on the Rock Crossing anticline.
0.3	(17.0)	Deese conglomerate is visible in road cut on the left and across the road it overlaps onto Sycamore beds. Sycamore beds dipping east exposed on small knoll immediately north of house on left.
0.1	(17.1)	To the south on crest of hill is exposed Woodford shale striking east-west on the nose of the northward plunging Rock Crossing anticline. On ridge to the southwest of barn is Sycamore limestone dipping west.

MILEAGE:

Reference Points	Accumulative	
0.2	(17.3)	Beds of Sycamore limestone dipping west. This ridge parallels the ridge previously mentioned above (immediately east) and is separated by faulting.
0.05	(17.35)	Turn left (south) through aluminum farm gate onto farm trail and continue south down a Caney shale valley.
0.25	(17.6)	On Kirby fault trace. Viola limestone faulted against Caney shale. Note that the road proceeds along the westward curving Kirby fault which successively cuts out beds of the Viola limestone from younger to older. The buses will stop at the point of termination of the Viola limestone by the Kirby fault.
0.4	(18.0)	STOP VIII — SYCAMORE HORSESHOE AND KIRBY FAULT — (Discussion by FREDERICKSON)

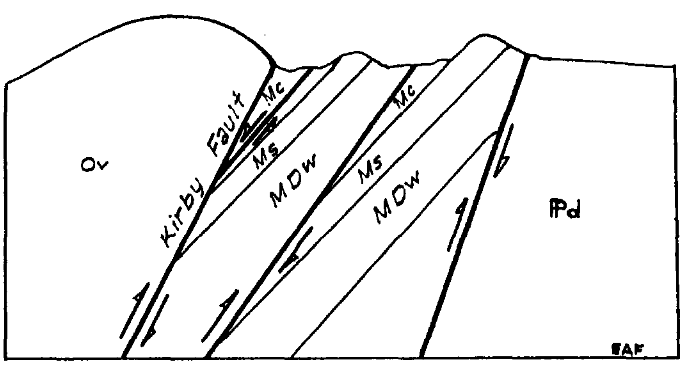
This area is of special interest because of the numerous structural complexities crowded into a relatively small area.

The Kirby fault which trends NW-SE north of this point, paralleling the Viola ridge, swings to a direction slightly west of south resulting in the elimination of the Viola ridge. Southward this trend continues. Successively the formations of the Simpson group, beginning with the Bromide are eliminated by the diagonal trend of the fault. Near the junction of the Criner and Kirby faults, the Kirby fault cuts strata of the Arbuckle group.

In the interpretation of the structure of the Sycamore horseshoe, the eastward-bulging convex arc of resistant Viola limestone, formed by the change in trend of the Kirby fault, plays an important part. (See cross-section and sketch map.)

The eastward thrust of the Viola, as a result of the reverse movement along the Kirby fault, was directed against the Sycamore limestone which dipped into the fault. The Sycamore (west limb of the Rock Crossing anticline) yielded by faulting. The broken segment nearest the fault was forced upward through the readily yielding incompetent Caney shale to a position parallel to the limb from which it was broken. Simultaneously the thrust of this broken segment folded the anticlinal structure to the east into an S-curve with accompanying minor faulting.

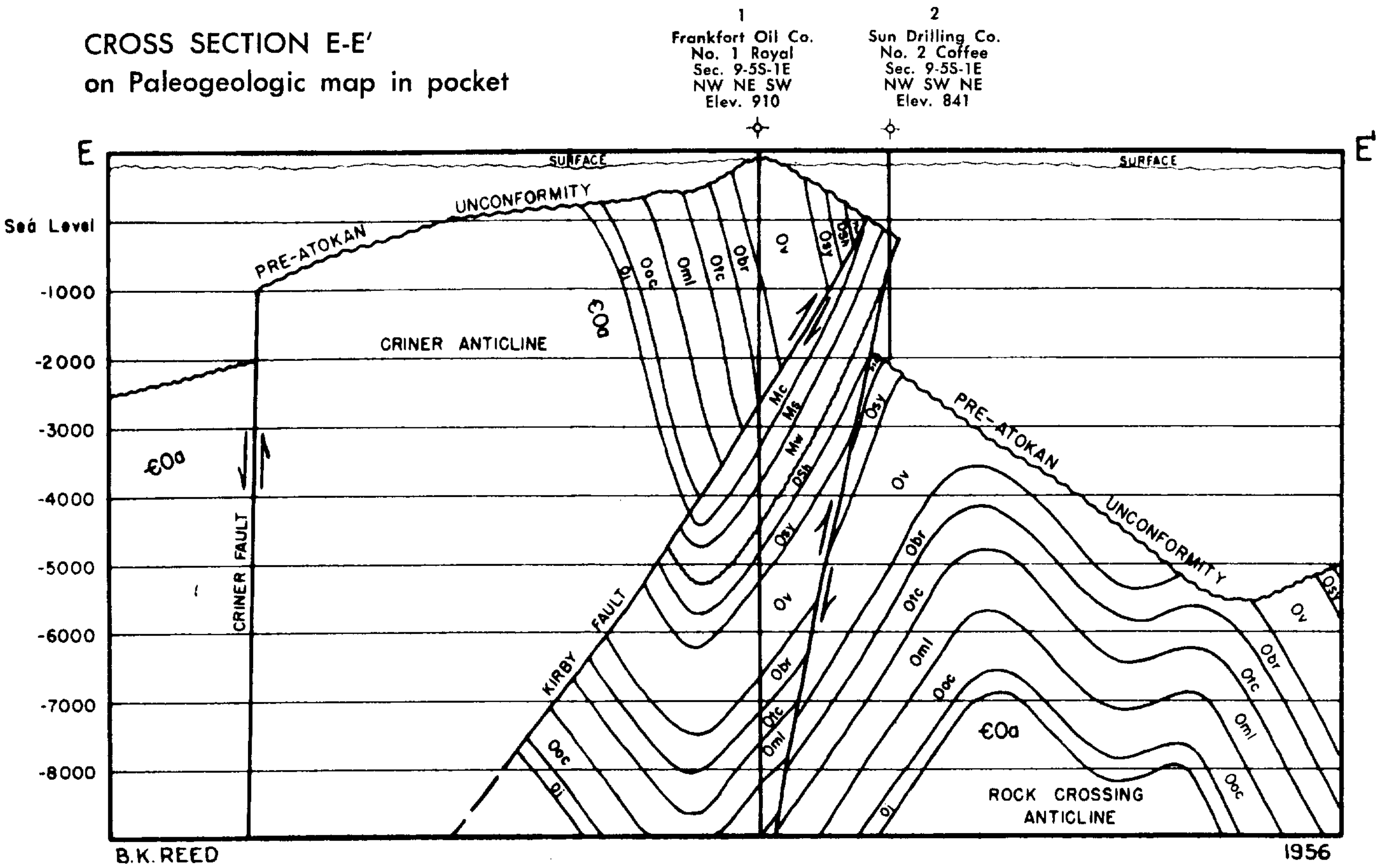
Retrace route to aluminum gate. Junction with gravel section road.

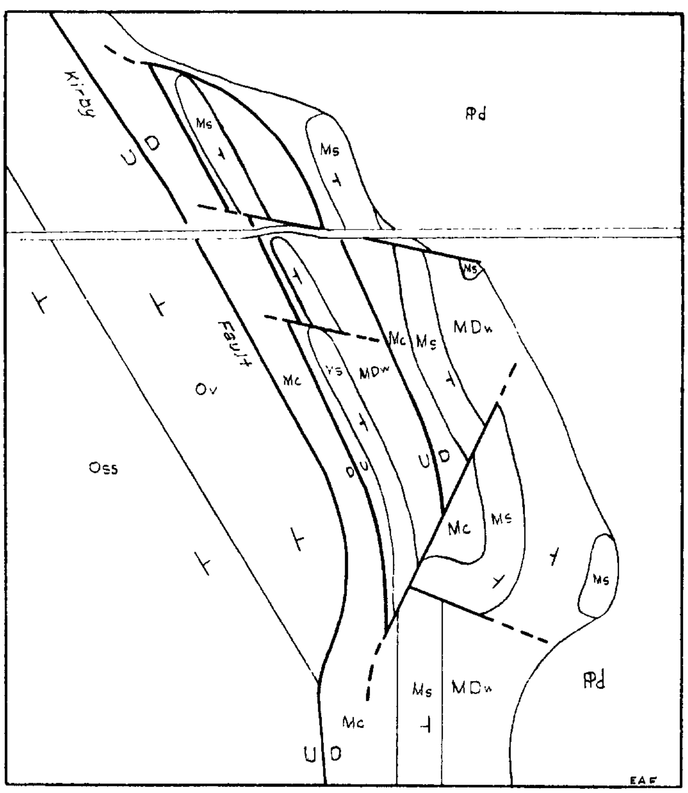


STOP NO. VIII

Diagrammatic cross-section sketch of the Sycamore horseshoe and Kirby fault

0.6	(18.6)	Turn right, continue eastward.
1.1	(19.7)	Intersection, turn right (south) and continue.
0.5	(20.2)	Intersection, turn left (east) sharply and continue on gravel road.
0.2	(20.4)	Outcrop of Anadarche limestone on right (south) forming east limb of Pleasant Hill syncline. Beds vertical to overturned here. (Stop No. 13 of 1948 Field Trip.)
0.2	(20.6)	Crossing "Deese" formation shales and sandstones on east limb of Pleasant Hill syncline. Beds overturned to west.
0.1	(20.7)	Asphalt pits in middle Deese sandstones to right and left of road.





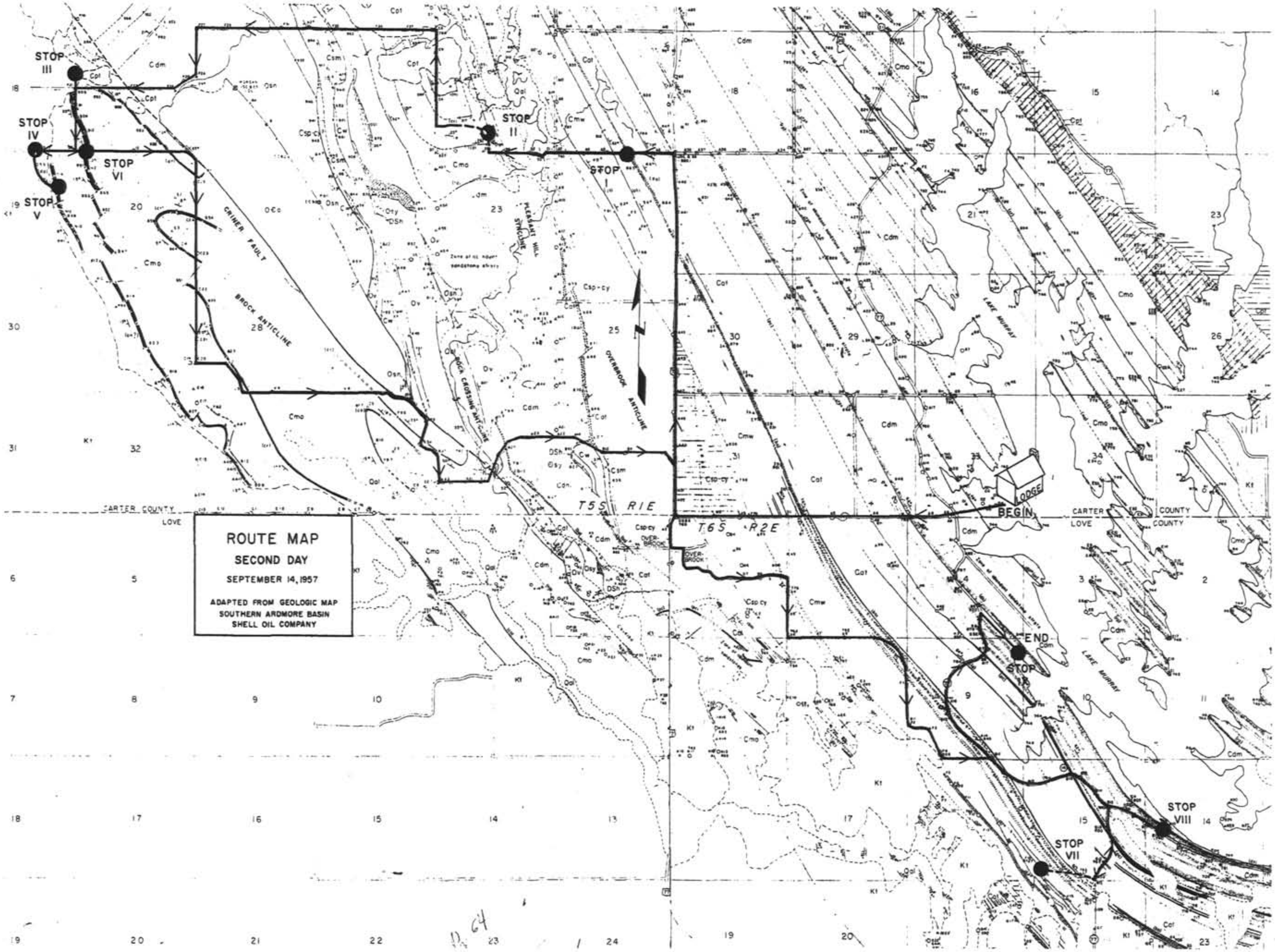
STOP NO. VIII

Sketch of Sycamore horseshoe area

MILEAGE:

Reference Points	Accumulative	
0.1	(20.8)	Deese conglomerate exposed on left (north). (Stop No. 12 of 1948 Field Trip.)
0.2	(21.0)	Crossing Goddard shales along axis of Overbrook anticline.
0.4	(21.4)	Intersection, turn left (north) and continue.
0.05	(21.45)	Intersection, turn right (east).
0.05	(21.5)	Ridge of Bostwick conglomerate member of the Lake Murray formation. This ridge is the northwest continuation of the Bostwick ridge seen early this morning at speedometer reading of 1.8.
0.3	(21.8)	Pumpkin Creek ridge on east limb of Overbrook anticline.
0.3	(22.1)	Devil's Kitchen member of "Deese" formation on east limb of Overbrook anticline.
0.4	(22.5)	Intersection with Highway 77, turn right and continue to Lake Murray Lodge, four miles south, and two miles east.

END OF FIRST DAY


ROUTE MAP
SECOND DAY
SEPTEMBER 14, 1957
ADAPTED FROM GEOLOGIC MAP
SOUTHERN ARDMORE BASIN
SHELL OIL COMPANY
STOP III
STOP IV
STOP V
STOP VI
STOP II
STOP I
STOP VII
STOP VIII
END
LODGE
BEGIN
CRINER FAULT
BROCK ANTICLINE
PLEASANT HILL SYNCLINE
OVERBROOK ANTICLINE
LAKE MURRAY
CARTER COUNTY
LOVE
LOVE COUNTY
T5S R1E
T6S R2E

ROAD LOG

SECOND DAY OF CONFERENCE

SATURDAY, SEPTEMBER 14, 1957

STRUCTURE AND STRATIGRAPHY OF THE PENNSYLVANIAN ROCKS SURROUNDING THE CRINER HILLS AND LAKE MURRAY AREA

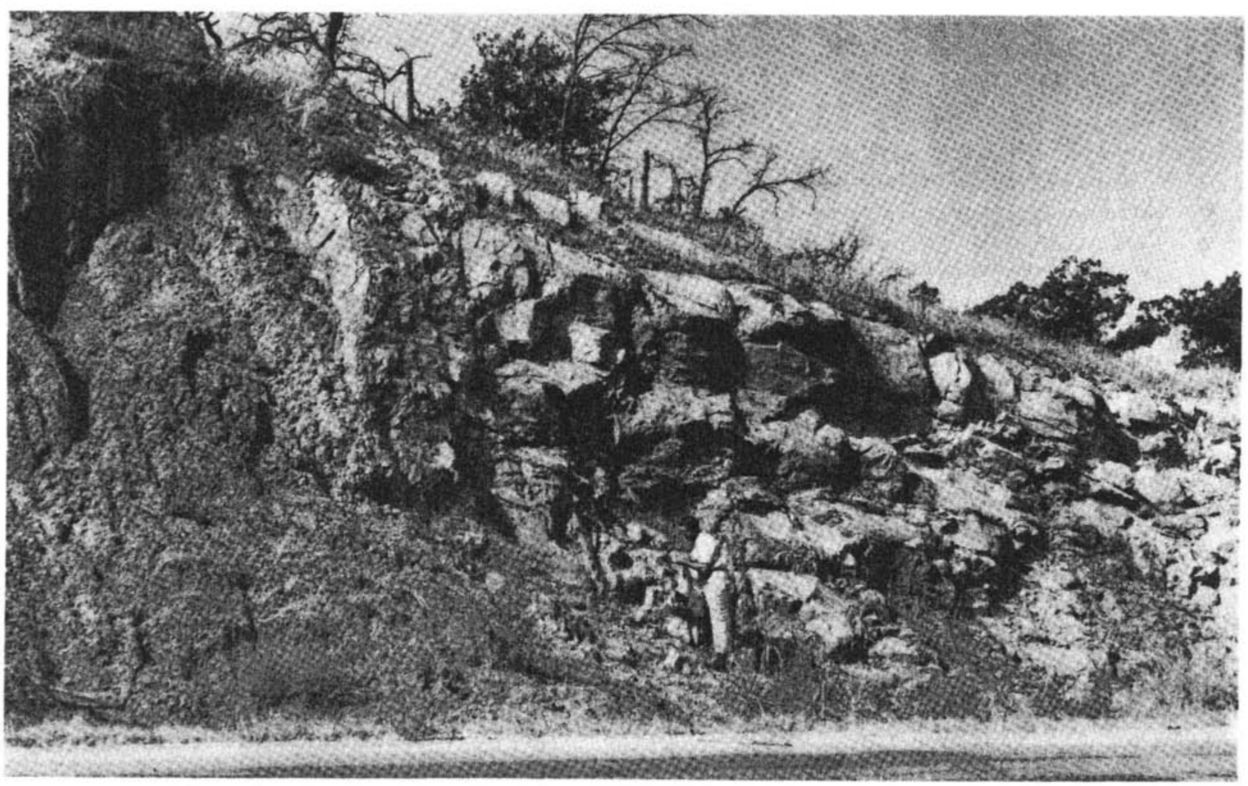
Assembly point will be the same as first day of field conference.

Starting Time 8:00 a.m. September 14, 1957
(Stop numbers superposed on Route Map)

Please, Please Do Not Set Fires in the Field Nor Throw Trash and Beer Cans Around.

MILEAGE:

Reference Points	Accumulative	
0.0		Continue west (straight ahead) until intersection of Highway 77-Scenic with Highway 77 is reached. Road geology along this part was given the previous day.
3.0	(3.0)	Intersection Highway 77-Scenic with Highway 77. Turn right (north) onto Highway 77 and continue.



"Mileage 2.6, Overbrook sandstone member of Springer group"

MILEAGE:

Reference Points	Accumulative	
3.1	(6.1)	Intersection, turn left (west) on gravel road.
0.4	(6.5)	STOP I — OVERBROOK ANTICLINE — (Discussion by FREDERICKSON)

The location of this stop is on the Bostwick member of the Dornick Hills group on the east flank of the Overbrook anticline. On the east flank of the anticline almost a complete section of Pennsylvanian sediments ranging from upper Springer to Hoxbar is exposed dipping into the Ardmore basin. Over 15,000 feet of consecutive section is present.

However, in the Pleasant Hill syncline, west of the Overbrook anticline, strata of Springer and Dornick Hills age are absent. Available evidence (See Ramay's abstract in the guidebook) indicates that the oldest Pennsylvanian strata resting unconformably on pre-Pennsylvanian beds are post-Arnold and pre-Rocky Point in age.

Thus it seems evident, as Tomlinson (Oklahoma Geological Survey, Bull. No. 46, March 1929) concluded, that the Criner area did not subside during the early period of deposition of the thick sequence of Pennsylvanian sediments in the Ardmore basin.

Rather, the Criner Hills formed the shelf, or hinge-line area. The sediments thinned westward from the basin toward the Criner Hills area, and Springer sediments apparently did not extend over the area now exposed.*

The Criner-Wichita orogeny in early Morrow time resulted in the development of the Criner anticlinorium. The rapidly eroding Criner area contributed quantities of coarse sediments to the Jolliff and Bostwick members of Dornick Hills age. Sediments from the Criner Hills area have not been identified in any of the post-Bostwick sediments, so it is logical to conclude that by the end of Bostwick time the hills were relatively low.

Gradually, the Pennsylvanian seas encroached on the Criner Hills area with accompanying deposition. Not until middle Deese time did seas extend over the flanks of the uplift to deposit the sediments now exposed in the Pleasant Hill syncline. The highest area of the hills exposing Arbuckle strata was finally inundated by Hoxbar seas.

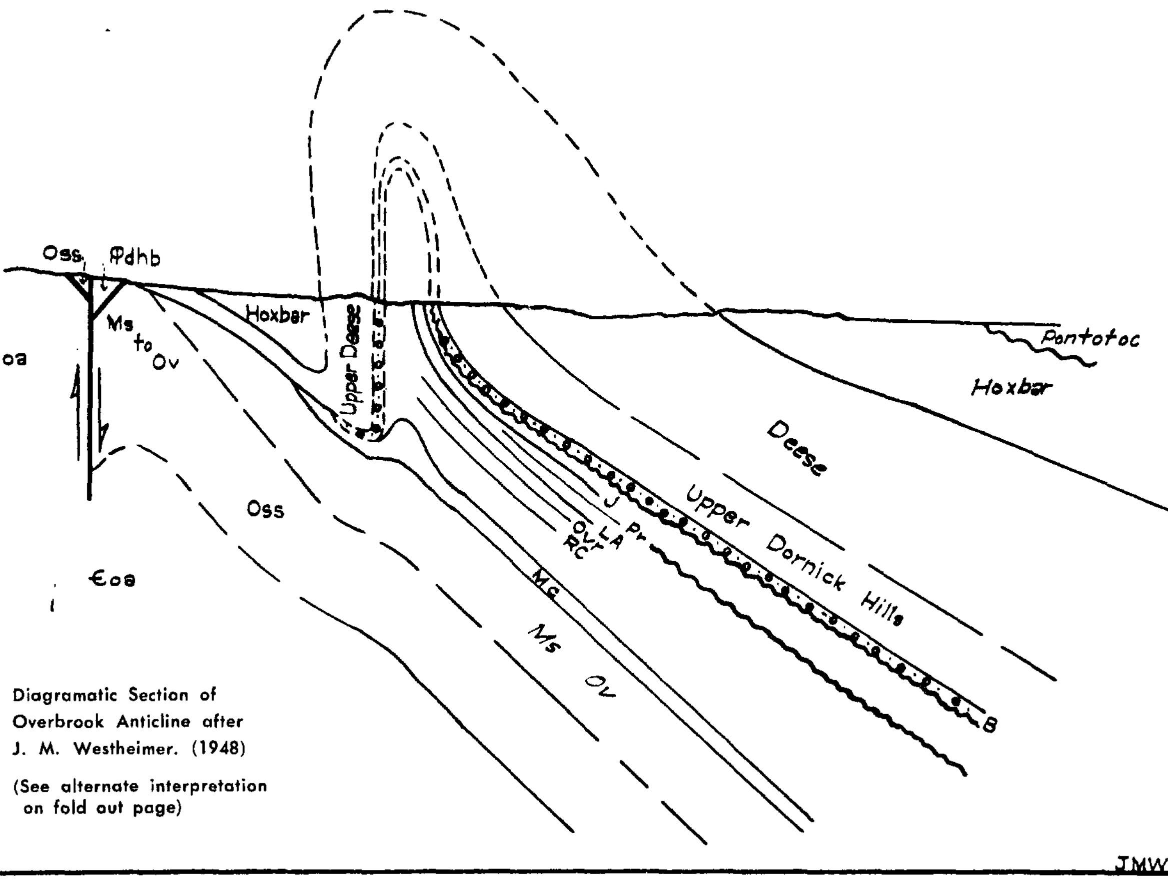
The Overbrook anticline was folded during the Arbuckle orogeny along with its associated structures, the Pleasant Hill syncline and Brock anticline. With the Criner Hills as a buttress, and the westward converging sediments forming an area of weakness, the locale of folding occurred adjacent to the Criner area. The Overbrook anticline was tightly folded and overturned to the west. According to Westheimer (Ardmore Geological Society Guide Book 1948) "the folding is thought to be mainly superficial, being largely absorbed by incompetent Pennsylvanian shale", (i.e. not greatly affecting the pre-Pennsylvanian strata). Estimates of the restored height of the anticline range up to two miles.

The net result of the combined factors of convergence, location of the anticlinal axis and elimination of strata (by overthrusting along the axis of the anticline and crustal shortening) is the absence of Pennsylvanian strata older than middle Deese on the west limb of the anticline.

Return to buses, continue straight ahead (west).

0.3	(6.8)	Otterville limestone member of Golf Course formation, Dornick Hills group, crossing road—poorly developed, dipping east.
0.1	(6.9)	Jolliff limestone member of Golf Course formation, crossing road dipping east.
0.2	(7.1)	Intersection—continue straight ahead (west).
0.1	(7.2)	Bridge over Hickory Creek. Approximate axis of Overbrook anticline.
0.4	(7.6)	Low hill of Williams limestone member of "Deese" formation on east flank of Pleasant Hill syncline. Beds overturned to west.

* EDITOR'S NOTE: Lang takes exception to the statement that the Springer sediments did not extend over the area now exposed. He believes that they probably did, but that they were truncated off of the hills by erosion after the Wichita orogeny. See his paper in the Guide Book.



Diagramatic Section of Overbrook Anticline after J. M. Westheimer. (1948)

(See alternate interpretation on fold out page)

MILEAGE:

Reference Points	Accumulative	
0.05	(7.65)	STOP II — PLEASANT HILL SYNCLINE—(Discussion by HUNTER)

The Pleasant Hill syncline lies between the Overbrook anticline to the east and the unnamed anticlinal structure to the west that is formed by Pennsylvanian beds that wrap around the nose of the Criner Hills. These structures were formed during the Arbuckle orogeny. The syncline plunges northwest from the area east of the tank battery on the Viola ridge (Stop I—First day). The expression of the syncline to be seen at the present stop is confined to the Confederate and Crinerville members of the Hoxbar formation.

Proceed northward from the buses, west of the N-S fence to the north-dipping Confederate limestone. At this locality, the Confederate member includes a basal sandstone and conglomerate unit, a middle limestone unit, and an upper conglomerate sandstone unit.

Note the attitude of the beds immediately west, and the trace of the Confederate outcrop expressed as a low ridge that trends west to the SW corner of Section 14. At this corner, the ridge swings sharply north and strikes N 30° W.

Follow the base of the limestone unit eastward and south around the sharp flexure to the overturned limb that strikes N 30° W and dips steeply east (overturned). Continue northward on this outcrop to the trees east of the farm pond. Note primary sedimentary structures that define the top of the formation (cross-bedding, graded bedding, scour and fill channels; particularly in the upper unit).

From this point the outcrop pattern of the Confederate member can be observed on both limbs and in the trough of the syncline. (See sketch map.) Note the expression of an anticlinal structure superimposed in the trough of the syncline. This anticlinal nose is the surface expression of the buried anticline present in the pre-Pennsylvanian sediments which produces to the south. It is believed that the Rock Crossing anticline as observed at Stop I (First Day), bifurcates to the north, one part expressed as the Rock Crossing anticline mapped in the surface rocks, and the other part forming a companion anticline roughly parallel to the Rock Crossing anticline extending in the subsurface beneath the Pleasant Hill syncline. The Southwest Ardmore pool produces from Simpson sands in this buried anticline. The sharp flexure on the southeast part of the outcrop trace is the result of crumbling in the more incompetent Pennsylvanian strata as they were thrust against the buttress of the buried anticline.

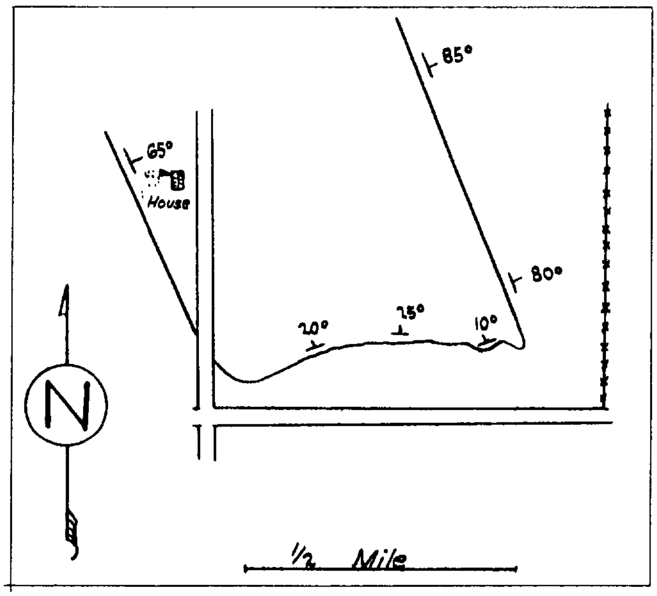
Proceed west across the dam and north along the shore of the pond to the ridge behind the farm buildings. Outcrop on this ridge is the Crinerville limestone member of the "Hoxbar" formation. The limestone contains fusulinids and numerous crinoidal fragments. Note that the trend of the Crinerville outcrop is generally concordant with the trace of the Confederate, but that the sharp flexure between the east limb and the east-west trough of the syncline shows a different expression in the Crinerville member.

Follow the ridge west to the road where the buses are parked. The Crinerville member is not exposed over the west part of the ridge, but crosses the road at the mail box east of the house where the buses are parked. A water well drilled by the Pleasant Hill church just north of this point penetrated about 75 feet of limestone, reflecting the rather steep dip of the member in the west limb of the syncline (approximately 65° NE).

Enter buses, continue straight ahead (west).

STOP NO. II

Sketch map of Confederate outcrop trace



MILEAGE:

Reference Points	Accumulative	
0.45	(8.1)	Intersection, turn right (north). We are retracing route as explained on the previous day's log.
0.5	(8.6)	Church, continue straight ahead.
0.6	(9.2)	Intersection, turn left (west) and continue. Still on route explained the first day.
1.1	(10.3)	Aluminum gate to left (south), continue straight ahead (west). From this point on route not explained the first day.
0.1	(10.4)	Viola limestone exposed on hills north and south of road. Note this is the northward continuation of the Viola ridge seen truncated by the Kirby fault at Stop VIII the previous day.
0.1	(10.5)	Crossing contact of Viola and upper Simpson beds, Bromide formation exposed in quarry to the right (north), with east dip, on the east flank of the Criner anticline. As we proceed westward we will progress toward older beds of the Simpson group.
0.3	(10.8)	Hill immediately south of road is Tulip Creek (?) and crosses the road with northeast dip. Ridge to southwest is Birdseye limestone of the Simpson group.
0.4	(11.2)	Intersection, turn left (south). At this point we are on Deese sediments which onlap onto the Arbuckle lime and Simpson beds of the Criner anticline. The Deese and Hoxbar crops form an anticlinal structure plunging to the northwest draped around the pre-Pennsylvanian beds of the Criner anticline.

MILEAGE:

Reference Points	Accumulative	
0.4	(11.6)	Curve in road; beds of Arbuckle limestone exposed to left. As we proceed westward, observe crops of Arbuckle strata striking east-west dipping north on nose of Criner anticline. Limestone conglomerates of Deese age lap upon the anticline at this point.
0.6	(12.2)	Crossing projection of trace of Criner fault in road. Wooded area to left on hill is Paluxy conglomerate (?). Trinity group, trending northwestward. (See last paragraph at Stop IV.)
0.3	(12.5)	Low ridge of Anadarche limestone member, Hoxbar formation dipping northeast, forming northeast limb of Brock anticline. Other limb of Anadarche limestone visible on horizon to the southwest (left) about one-half mile.
0.2	(12.7)	Intersection—Grocery store, turn right (north) and continue.
0.2	(12.9)	STOP III — VANOSS CONGLOMERATE — (Discussion by HUNTER)

At this locality, Vanoss conglomerate of Virgilian age lies unconformably on Hoxbar sediments that dip northwest off the nose of the Criner upland. East of the bridge in the stream cut that extends along the north end of the ridge, nodular shales similar to those beneath the Daube limestone member are exposed.

Two distinct lithologic varieties of the Vanoss are present. The predominant phase is a granule to pebble conglomerate containing subangular fragments of quartz and black to dark-grey chert. Some of the chert is lighter in color and somewhat tripolitic. Sand grains in the matrix are angular to subangular. The cement is carbonate, with a small amount of clay in some specimens. A medium-grained sandstone phase, in places conglomeratic, overlies the conglomerate. The clasts are mainly subangular to subrounded, but some rounded, frosted grains of quartz are present. Granulite to pebble-sized fragments of chert and quartz in the conglomeratic sandstone are similar to those in the conglomerate phase. The rock is poorly indurated, and such cement as is present appears to be clay and a small amount of silica.

Scattered fragments of Paluxy sandstone and conglomerate occur as erosional remnants on the Vanoss surface. The lithology of these rocks and the relation between the Vanoss and the Paluxy beds will be discussed at the next stop.

Retrace route to previous road intersection with grocery store and continue straight ahead (south).

0.5	(13.4)	Anadarche limestone dipping southwest on southwest limb of Brock anticline. Note oil wells of the Brock field. Note westward dip slope of Anadarche limestone east of road.
0.4	(13.8)	Intersection, turn right (west).
0.3	(14.1)	STOP IV — PALUXY FORMATION — (Discussion by HUNTER)

Sandstones and conglomerates of the Paluxy formation of the Trinity group (Comanchean) lie unconformably above Hoxbar sediments dipping westward on the west flank of the Brock anticline. Clasts in the Paluxy consist mainly of rounded to subrounded pebbles of quartz and rounded, frosted "golf ball" quartz grains. Opaline silica, which in places is weathered to chalky white tripolitic silica, is the predominant cement. Note the lenses of sand within the conglomerate that resemble the sand observed at the top of the Vanoss at the previous stop.

The Vanoss formation is characterized by angular to subangular clasts of chert and quartz cemented by carbonate. The clasts in the Paluxy are well-rounded, particularly quartz grains which form rounded, frosted, "golf ball' sands. The cement in Paluxy rocks is silica, much of it opaline. Some of the sands at the top of the Vanoss at Stop III contain scattered "golf ball" quartz grains and appear to be lacking in carbonate cement. These sands have characteristics common to both the Vanoss and Paluxy rocks.

A small ridge west of the Criner fault in the south central part of Section 17 is underlain by a conglomerate consisting of subangular pebbles of quartz and dark chert, and mostly angular to subangular quartz grains characteristic of the Vanoss. However, sand lenses in the conglomerate contain some rounded "golf ball" grains, and the cement of the conglomerate is mainly silica. It appears that the conglomerate is a Paluxy deposit formed nearly in place by reworking of the Vanoss conglomerate by the Cretaceous seas.

Return to buses and proceed ahead.

MILEAGE:

Reference Points	Accumu-lative	
0.03	(14.13)	Turn left (south) through gate on lease road, passing over Trinity group sands.
0.47	(14.6)	STOP V — DAUBE LIMESTONE MEMBER — (Discussion by FREDERICKSON)

(This is LUNCH STOP. Food is prepared by The Ardmore Geologists' Wives Society. After lunch there will be an examination and discussion of the stop.)

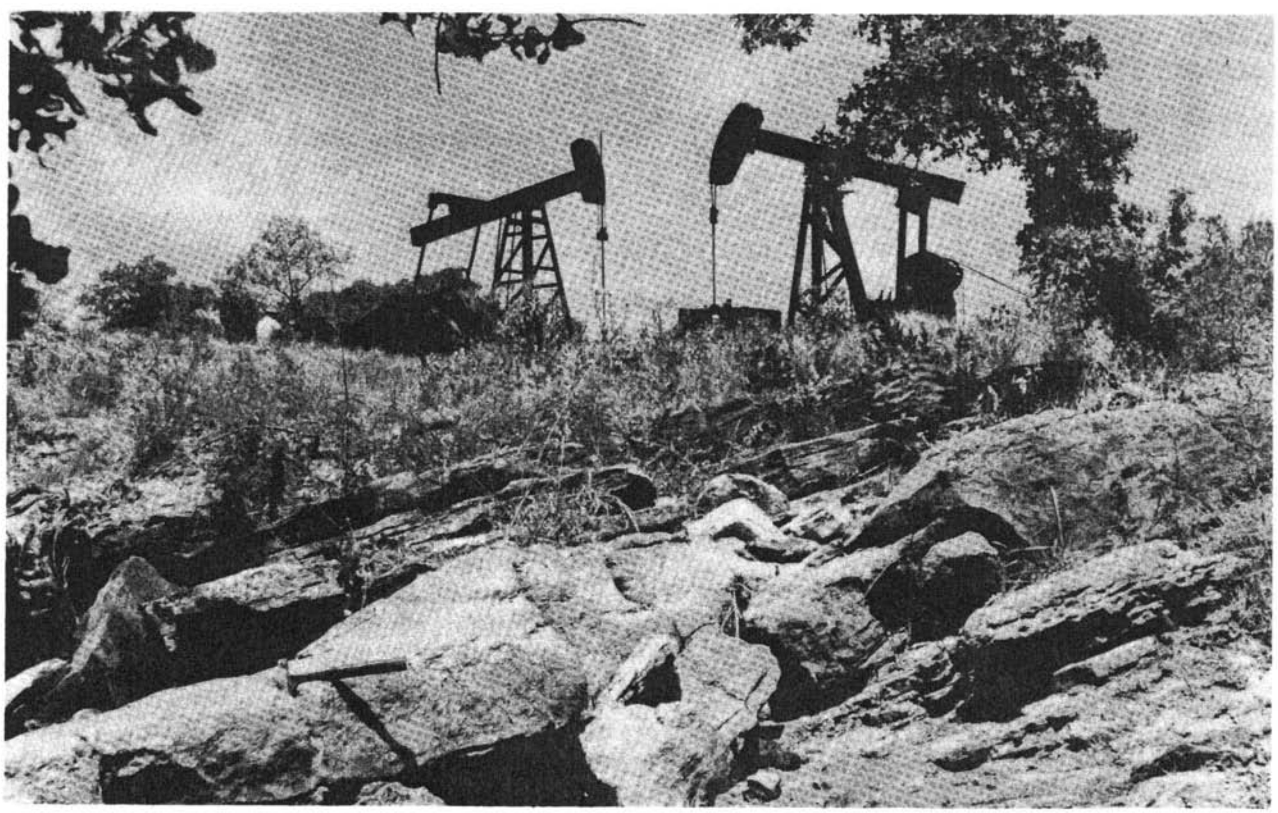
The stratigraphic section of the Daube member exposed along Spring Branch Creek at this stop is one of the most complete sequences in the Ardmore Basin area.

Thick, firmly cemented calcareous sandstones are exposed in the creek bed at the top. These are underlain, after a shale interval, by the main limestone sequence. The limestones range from medium-crystalline, tan to brown beds to dense, gray limestone with abundant cross-sections of brachiopod shells on weathered and broken surfaces. The latter rock type is considered the more typical expression of the Daube limestone. Several thin beds with fusulinids (*Triticites*) in profusion are exposed in the creek.

The limestones are underlain by shales and thin limestone and sandstone beds. Some distance down the creek nodular shaly beds crop out which strongly resemble the nodular beds underlying the Vanoss conglomerates (Stop III, second day).

The lithology of the Daube limestone in the Brock anticline is in strong contrast to the lithology as exposed in the Lake Murray area, where a thin coal seam underlies the limestone, and thick limestone and chert pebble conglomerates occur at the top and bottom of the member.

Retrace lease road to gate, turn right (east) and proceed straight ahead.



"Daube ls on northwest flank of Brock anticline"

MILEAGE:

Reference Points	Accumulative	
1.6	(16.2)	Intersection, continue straight ahead.
0.1	(16.3)	STOP VI — BROCK ANTICLINE — (Discussion by FREDERICKSON)

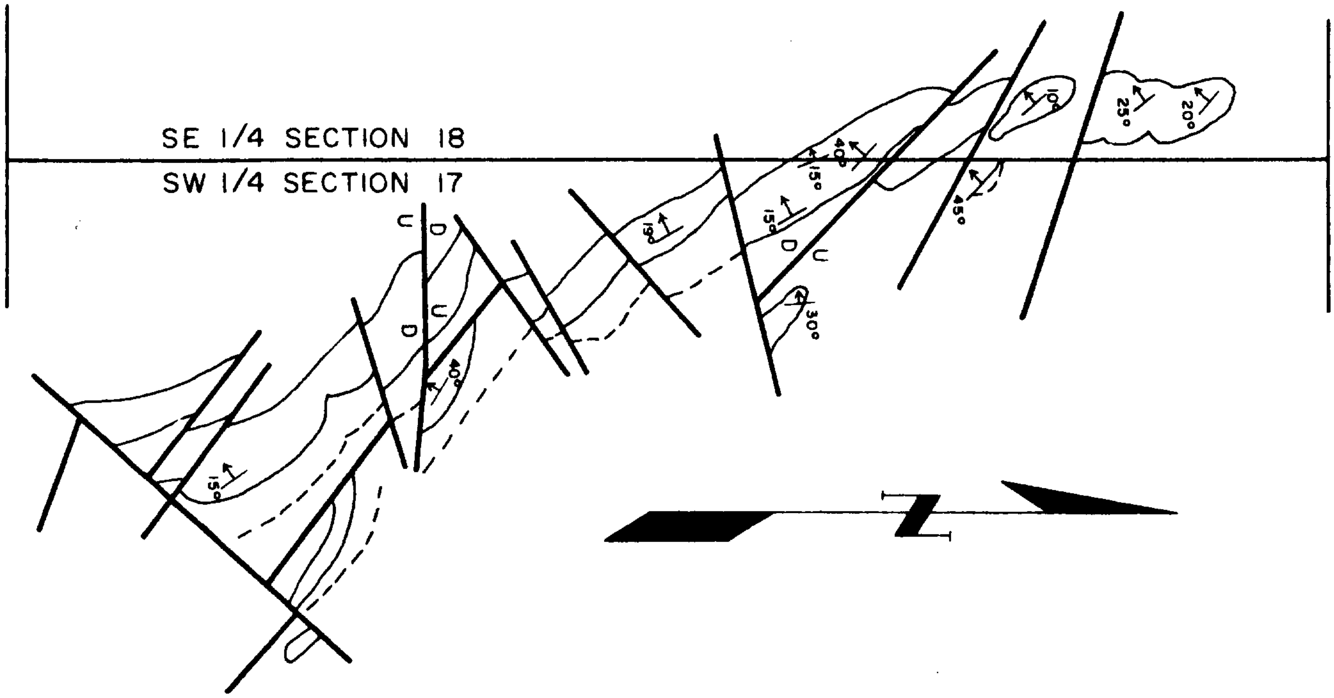
This stop is on the Anadarche limestone member of the Hoxbar formation exposed on the west limb of the Brock anticline. Looking to the east the sharp, straight expression of the Criner fault scarp is visible along the upland formed by the resistant Arbuckle limestone. Close to the fault, the east limb of the Brock anticline is visible formed by the low ridge of the Anadarche limestone across the anticline. The northwestward plunging nose of the Brock anticline as expressed by the outcrop of the Anadarche limestone is covered by onlap of Vanoss strata. The west limb on which we are standing is broken by numerous cross faults of relatively small magnitude. The larger of these have affected oil concentration within the anticline proper. (See Tomlinson's map, immediately following.)

In the foreground along the road, the small ridge marks the exact center of the Brock anticline. The ridge is formed by thin limestones of the Dolman member. Heretofore, the Dolman limestone has been described* only from the subsurface occurrence in the Lone Grove Field located about five miles northwest.

From this stop the route will continue in a general southeasterly direction passing over the nose of the anticline as exposed in the older Crinerville limestone and then continuing into older beds. Please consult your road log.

0.4	(16.7)	Dolman limestone member described in the subsurface of the Lone Grove field by J. Westheimer and F. P. Schweers*. This is the approximate axis of the Brock anticline.
0.3	(17.0)	Anadarche limestone on east flank of Brock anticline.
0.2	(17.2)	Passing along Criner fault at this point. Arbuckle limestone forms hills to the east with Hoxbar sediments of the Brock anticline faulted down against it to the west.
0.2	(17.4)	Continuation of Anadarche limestone ridge into fault.
0.1	(17.5)	Dolman limestone member dipping east.
0.3	(17.8)	Crinerville limestone member. This is the NE limb of the Brock anticline. The nose of the anticline as exposed in the Crinerville is located in the camp area west of the road.
0.3	(18.1)	Crinerville limestone member on southwest limb of Brock anticline. A fault displaces the nose of the anticline as exposed in the Crinerville limestone and repeats the southwest limb of the anticline. The fault passes diagonally in a southwesterly direction about half way between here and next ridge south—which can be seen ahead in the road. The ridge to the south is a continuation of the Crinerville limestone on the southwest limb of the anticline.
0.3	(18.4)	Repetition of Crinerville limestone member referred to in last paragraph.
0.6	(19.0)	Intersection, turn left (east).
0.1	(19.1)	Cemetery on left (north).
0.1	(19.2)	Bear right, the road is now paralleling the Crinerville limestone, exposed in the woods to the left, on the southwest limb of the Brock anticline.
0.3	(19.5)	Bear left.
0.1	(19.6)	Crinerville limestone crossing road.
0.7	(20.3)	Arbuckle limestone in fault contact with Hoxbar formation—Criner fault.
0.8	(21.1)	Road intersection—junction of Criner and Kirby faults (Stop V—previous day). Continue ahead. From this point to Highway 77 we are retracing previous day's route.
0.8	(21.9)	Intersection, turn left (east).
0.6	(22.5)	Rock Crossing bridge (Stop IV previous day).
0.6	(23.1)	Intersection, continue straight ahead (east).
0.3	(23.4)	Woodford quarry (Stop II previous day).
0.3	(23.7)	Intersection, continue straight ahead (east).

* Petroleum Geology of Southern Oklahoma, vol. I, 1956, The Amer. Assoc. of Petr. Geol., pp. 146-147.



SURFACE OUTCROP

ANADARCHE LIMESTONE

SECTION 17 & 18 T5S-R1E

0 500' 1000'

C.W. TOMLINSON 1925

MILEAGE:

Reference Points	Accumulative	
0.6	(24.3)	Intersection with Highway 77—turn right (south).
0.3	(24.6)	Intersection Park road—continue straight ahead (south).
0.3	(24.9)	Town of Overbrook, turn SHARP left (east) on gravel road.
0.1	(25.0)	Intersection—continue straight ahead (east).
0.1	(25.1)	Turn right (south) paralleling railroad track.
0.3	(25.4)	Sharp left (east).
0.1	(25.5)	CAUTION — Railroad crossing — NO SIGNALS.
0.1	(25.6)	Ridge of Overbrook sandstone, Springer group on east limb of Overbrook anticline.
0.5	(26.1)	Intersection, turn right (south) and continue.
0.5	(26.6)	Intersection, turn left (east). Hill to the right (south) is Paluxy sandstone.
0.3	(26.9)	Sandstone ridge in Springer group.
0.5	(27.4)	Curve—on Bostwick conglomerate ridge. Note conglomerates to the left.
0.4	(27.8)	Curve right—Now off the Bostwick conglomerate ridge.
0.5	(28.3)	Curve left—road paralleling Paluxy ridge on right.
0.2	(28.5)	Curve right.
0.2	(28.7)	Curve left—due east.
0.4	(29.1)	Recrossing Bostwick conglomerate ridge.
0.1	(29.2)	Intersection—Junction with Highway 77-Scenic, turn right on pavement. Note Tucker Tower to east on prominent ridge of Devil's Kitchen conglomerate member of "Deese" formation.
0.5	(29.7)	Small ridge of Lester limestone member of Lake Murray formation.
0.3	(30.0)	Prominent ridge of Pumpkin Creek limestone member of Big Branch formation.
0.4	(30.4)	Intersection, turn right (south) on Highway 77-Scenic.
0.1	(30.5)	Crossing Pumpkin Creek limestone dipping east.
0.5	(31.0)	Slow, turn right through aluminum gate onto farm road leading west.
0.1	(31.1)	STOP VII — JOLLIFF, OTTERVILLE AND BOSTWICK MEMBERS ON EAST LIMB OF OVERBROOK ANTICLINE — (Discussion by FREDERICKSON)

Walk northwestward angling up-dip across the strike of the Bostwick member and continue across Otterville limestone to Jolliff conglomerate ridge. Discussion will be held on the Jolliff outcrop.

These outcrops are located on the east flank of the Overbrook anticline dipping east at 70 to 80 degrees.

The Jolliff member which is extremely conglomeratic at this locality becomes less conglomeratic and more limey northwestward along the strike. A thin limestone is at the top of the member. The Jolliff includes pebbles and cobbles of pre-Pennsylvanian strata derived from the Criner Hills. Pebbles as old as Simpson Birdseye limestone have been identified here. This is the earliest occurrence of coarse clastics derived from pre-Pennsylvanian sediments recognized in the Pennsylvanian strata of the Ardmore basin area. Tomlinson (O.G.S. Bulletin No. 46) concluded from these conglomerates that the Criner Hills orogeny occurred at or shortly before the beginning of Dornick Hills (Jolliff) time.

The Otterville member is primarily a platy, granular limestone at this locality. The relatively thick limestone sequence exposed here can only be traced for about one-half mile. Some conglomerate beds are associated with the limestones.

The Bostwick member at this stop contains one of the thickest sequences of conglomerates observable in the Ardmore basin area. Pebbles and cobbles as old as Arbuckle from the Criner Hills area can be identified. Near the corral, limestones of the upper Bostwick can be observed. The Bostwick conglomerates mark the culmination of the Criner-Wichita orogeny in the Ardmore basin area. As Tomlinson (1929, op. cit.) stated, "no conglomerates have been noted in the upper part of the Dornick Hills formation above the Bostwick member, nor does the overlying Deese formation, although 7000 feet thick, contain any conglomerates for whose pebbles the Criner Hills seem a likely source."

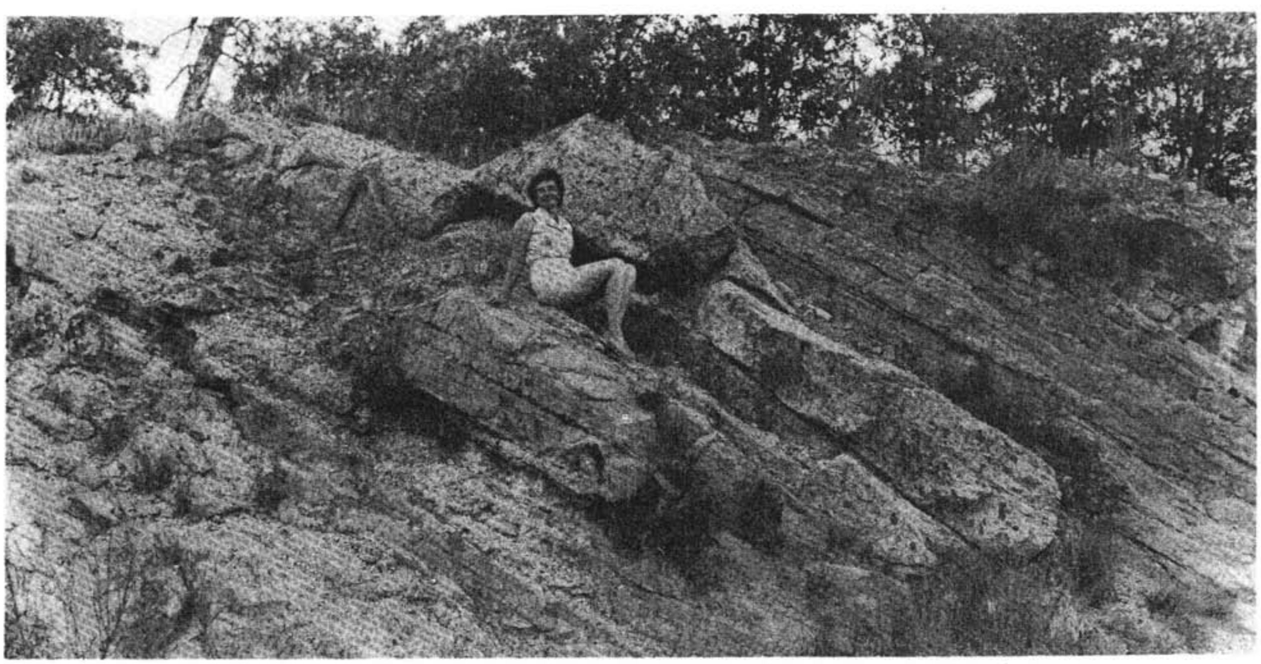
Retrace route back to aluminum gate onto Highway 77-Senic, turn left (north) and proceed.

MILEAGE:

Reference Points	Accumulative	
0.8	(31.9)	Intersection, turn right (east). Entering Lake Murray State Park. Follow paved road to spillway.
0.4	(32.3)	STOP VIII — LAKE MURRAY SPILLWAY — (Discussion by FREDERICKSON)

From here for over a mile the Devils Kitchen conglomerate forms a natural dam for Lake Murray except where the gap of former Anadarche Creek is plugged by a short artificial dam. The excavation for the spillway affords an excellent exposure of tilted Devils Kitchen sandstone and conglomerate. See Stop IX for further discussion.

Devil's Kitchen sandstone at Spillway



Devil's Kitchen sandstone and conglomerate at Spillway

MILEAGE:

Reference Points	Accumulative	
0.4	(32.7)	Intersection with road to Marietta to left (south). Continue northwest on Highway 77-Scenic.
1.9	(34.6)	Bostwick conglomerate ridge to left.
0.2	(34.8)	Lester limestone member of Lake Murray formation exposed in bar pit to left.
0.3	(35.1)	Pumpkin Creek limestone exposed in road cut to left.
0.4	(35.5)	Intersection, turn right (east) into Buzzard's Roost picnic area.
0.4	(35.9)	STOP IX — BUZZARD'S ROOST (Alternate Stop) — (Discussion by FREDERICKSON)

The prominent ridge visible here is supported by well-cemented, chert conglomerates in the upper part of the Devil's Kitchen member of the Deese formation. At the base of the formation (not exposed here), is a thick (100-200 feet) sequence of sandstones, and between the sandstones and shales is a fossiliferous limestone-shale interval which can be seen along the main park road northward.

Northwestward along the strike of the Devil's Kitchen member the upper unit gradually loses its conglomeratic character and becomes a sandstone. Tomlinson (op. cit.) first suggested that the source of the chert pebbles was probably in the region of Llanoria. Work by Schacht (O.U. Master's thesis) showed that the chert was derived from Ouachita facies rocks. (See Schacht's abstract in Guide Book.)

From the top of the ridge a splendid view of the lake can be obtained. The effect of the structure and stratigraphy of the underlying rocks upon the lake is very evident in the bays and the prominent points that trend in a northwest-southeast pattern.

BUSES WILL RETURN TO THE LODGE WHERE THE

MEETING WILL DISBAND

HAVE A SAFE TRIP HOME

OR

STAY AWHILE AND USE THE NEXT MAP TO FIND

YOUR FAVORITE FISHING HOLE

PRE-ATOKAN PALEOGEOLOGIC MAP
CRINER HILLS AXIS
PORTIONS OF LOVE AND CARTER COUNTIES, OKLAHOMA

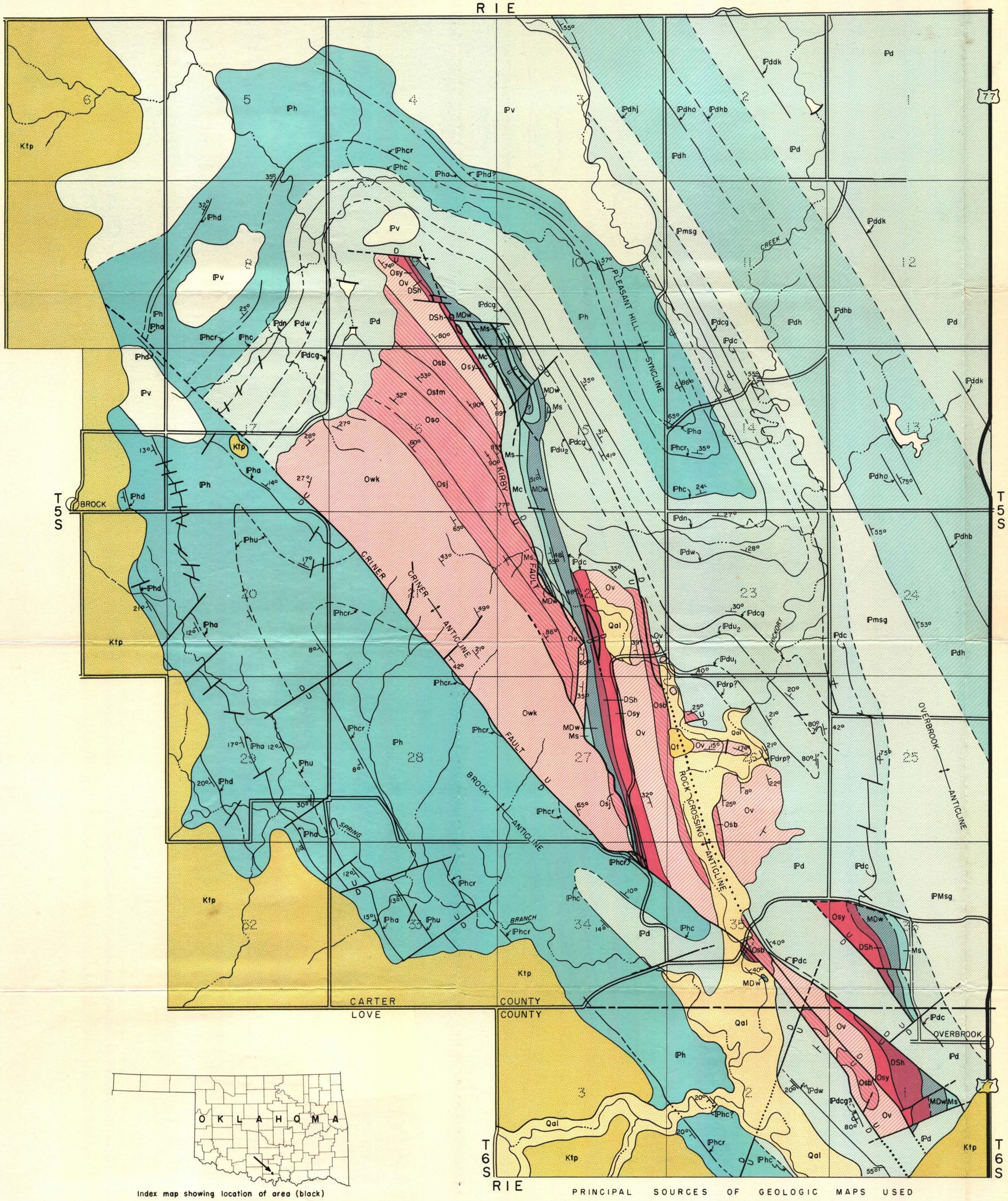
SCALE 1½ INCH = 1 MILE

B.K. REED 1956

OKLAHOMA GEOLOGICAL SURVEY
Carl C. Branson, Director

GEOLOGIC MAP OF THE CRINER HILLS AREA OKLAHOMA

by
E. A. Frederickson
1957



0 1/2 1 2
SCALE IN MILES

EXPLANATION

QUATERNARY

Qt Qal
ALLUVIUM (Qal) and TERRACE DEPOSITS (Qt)

CRETACEOUS

Ktp
PALUXY SAND
(Basal formation of Trinity group in this region.)

PENNSYLVANIAN

IPv
VANOSS FORMATION

IPh: IPhd, IPha, IPhu, IPhcr, IPhc
HOXBAR GROUP
(Hoxbar group, IPh, contains Daube limestone, IPhd; Anadarche limestone, IPha; unnamed limestone [Dolman formation?], IPhu; Crinerville limestone, IPhcr; and Confederate limestone, IPhc.)

IPd: IPdn, IPdw, IPdcg, IPdu2, IPdu1, IPdrp?, IPdc, IPddk
DEESE GROUP
(Deese group, IPd, contains Natsy limestone, IPdn; Williams limestone, IPdw, unnamed limestone-shale-conglomerate-sandstone sequence, IPdcg; unnamed upper sandstone, IPdu2; unnamed lower sandstone, IPdu1; Rocky Point [?] sandstone, IPdrp?; unnamed conglomerate, IPdc; and Devils Kitchen conglomerate, IPddk.)

IPdh: IPdhb, IPdho, IPdhj
DORNICK HILLS GROUP
(Dornick Hills group, IPdh, contains Bostwick conglomerate, IPdhb; Otterville limestone. IPdho; and Jolliff limestone, IPdhj; Group is absent by convergence and by pre-Deese erosion on northeast limb of Pleasant Hill syncline.)

MISSISSIPPIAN

IPMsg
SPRINGER and GODDARD FORMATIONS

Mc
CANEY SHALE

Ms
SYCAMORE LIMESTONE

DEVONIAN

MDw
WOODFORD FORMATION

SILURIAN

DSh
HUNTON GROUP

ORDOVICIAN

Osy
SYLVAN SHALE

Ov
VIOLA LIMESTONE

Osb, Ostm, Oso, Osj
BROMIDE FORMATION (Osb), TULIP CREEK and McLISH FORMATIONS (Ostm), OIL CREEK FORMATION (Oso), and JOINS FORMATION (Osj) OF SIMPSON GROUP.

Owk
WEST SPRING CREEK and KINDBLADE FORMATIONS OF ARBUCKLE GROUP

Formation contact lines
Dashed where inferred
Dotted where concealed

Fault
Dashed where inferred
Dotted where concealed
U, Upthrown side
D, Downthrown side

65° Strike and dip of beds

86° Overturned beds

Anticline

Syncline

77 U. S. Highway

Improved road

PRINCIPAL SOURCES OF GEOLOGIC MAPS USED

M. S. Theses University of Oklahoma	Graduate student Special Mapping Problems University of Oklahoma		Unpublished Map
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Ramay, C.L., 1957	Couch, K.R.	Pendleton, W.M.	Oil Co., Pre-Pennsylvanian
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