



ITINERARY: SOME STRATIGRAPHIC AND STRUCTURAL FEATURES OF THE MIDDLESBORO BASIN

By

R. E. Hauser, F. H. Walker and V. E. Nelson

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Robert E. Hauser
Frank H. Walker
Vincent E. Nelson

Road Log for Field Conference, Geological Society of Kentucky
and
Appalachian Geological Society

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SUMMARY OF PROGRAM

Thursday, April 25, 1957

1. Headquarters for the Spring Field Conference of the Geological Society of Kentucky and Appalachian Geological Society is the Middlesboro Hotel, Middlesboro, Kentucky.
2. Registration 6:00-8:00 P.M. Eastern Standard Time. Obtain guidebooks and make reservations for banquet.
3. Informal meeting outlining highlights of the trip 8:00 P.M. Eastern Standard Time.

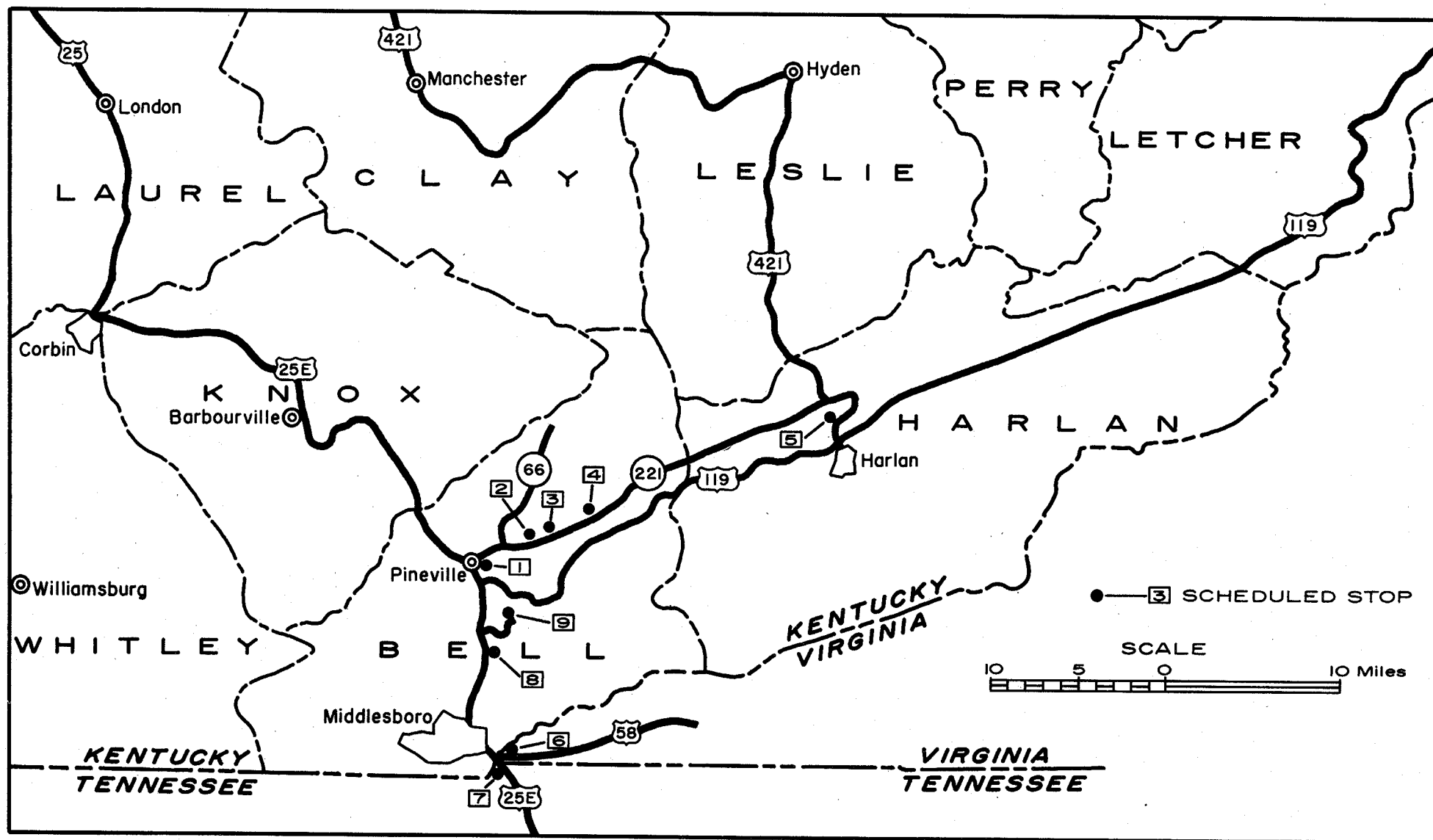
Friday, April 26, 1957

4. Depart at 8:00 A.M. Eastern Standard Time. Bus transportation will be used and no private cars allowed. View stratigraphic sequence from Upper Devonian to Pennsylvanian and the Pine Mountain overthrust with associated structures. Lunch stop at various restaurants at Pineville.
5. 7:00 P.M. Eastern Standard Time. Annual banquet, speakers, and business meeting.

Saturday, April 27, 1957

6. Depart Middlesboro at 8:00 A.M. Eastern Standard Time. Private transportation will be used. Stops will be made at Cumberland Gap and at Rocky Face fault. Field meeting will end at noon between Pineville and Middlesboro.

Please note that all times are Eastern Standard Time.



ROUTE MAP

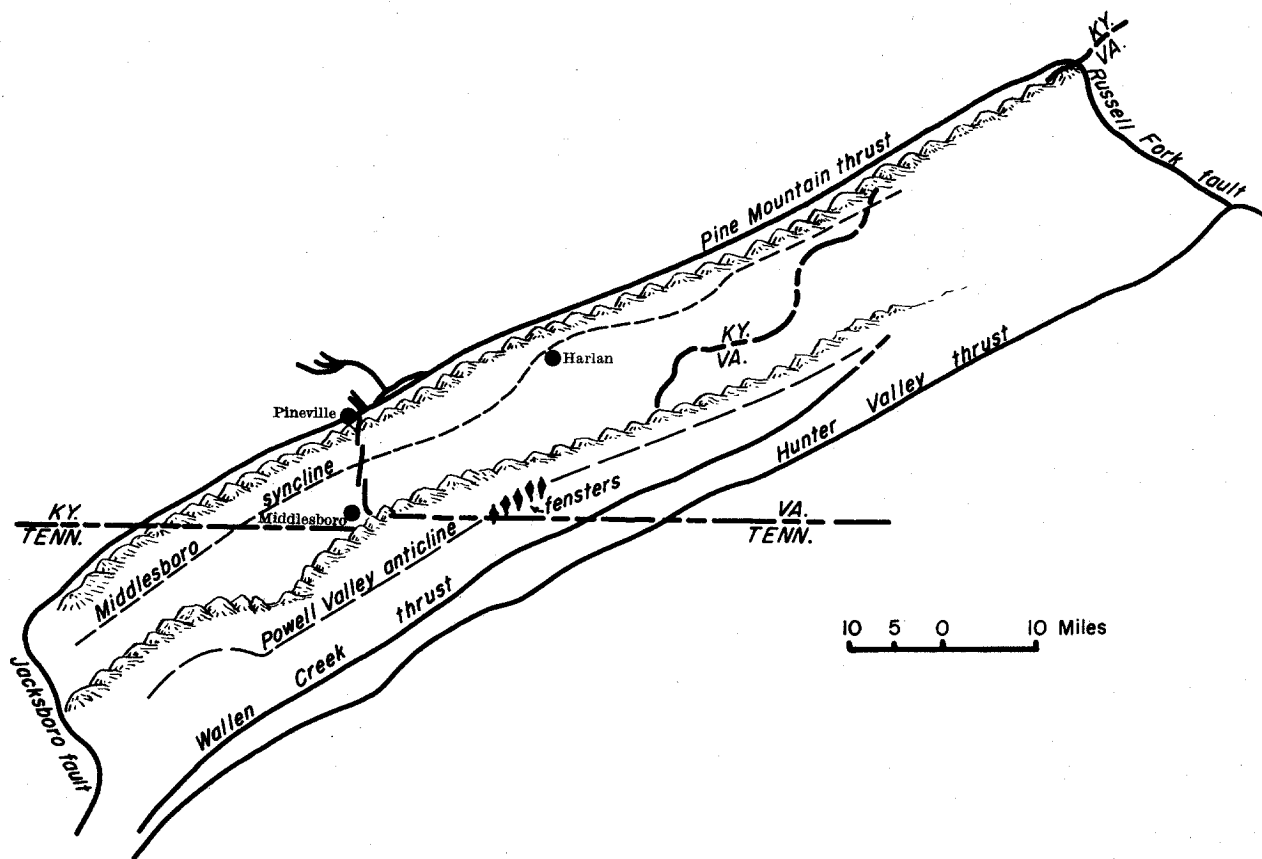
KENTUCKY AND APPALACHIAN GEOLOGICAL SOCIETIES FIELD TRIP

FIGURE 1

Stratigraphic Section for Middlesboro Basin

Pennsylvanian	Breathitt	1000±
	Lee	1100±
Mississippian	Pennington	175'
	Greenbrier ("Big Lime") ?	Glen Dean-Haney 110'
		Reelsville - Beech Cr. 60'
		Paoli - Beaver Bend 70'
		Ste. Genevieve 150'
		St. Louis 40'
		Fort Payne 15'
	Price - Maccrady	150'
Mississippian - Devonian	New Albany	100±

Fig. 2



SKETCH MAP OF CUMBERLAND THRUST BLOCK

(ADAPTED FROM MCFARLAN AND CAMPBELL, 1955)



STRUCTURE SECTION FROM PINE MOUNTAIN TO CUMBERLAND MOUNTAIN

VERTICAL EXAGGERATION 10X

Fig. 3

ROAD LOG

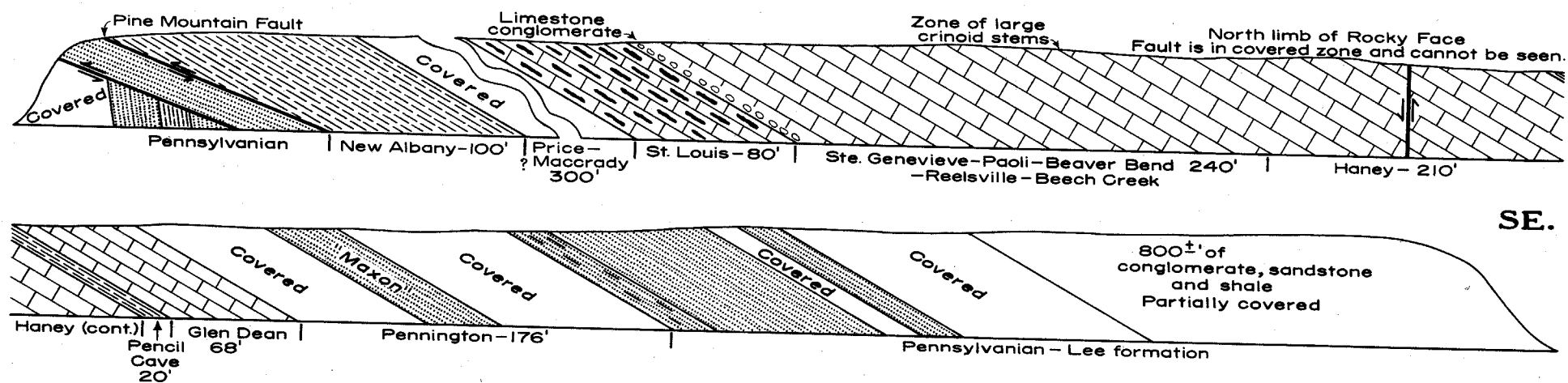
Friday, April 26, 1957

Assembly point.--Busses will assemble at the corner of Cumberland Avenue and Sixteenth Street which is three blocks east of the Middlesboro Hotel at Middlesboro. Departure time is 8:00 a. m., e. s. t.

Mileage

- 0.0 Corner of Cumberland Avenue (Ky. Route 186) and Sixteenth Street. Go east on Cumberland Avenue.
- 0.3 Stop light. Junction of U. S. Route 25E and Cumberland Avenue (Ky. Route 186). Turn left (north) on U. S. Route 25E.
- 11.1 Pineville city limits.
- 11.7 Junction of U. S. Route 25E and Ky. Route 66. Turn right on Ky. Route 66 and continue through Pineville.
- 12.1 L. & N. Freight Depot.
STOP NO. 1. Pineville section. See figure 4. Two hours. This section was measured along the L. and N. Railroad from just across the railroad bridge south to U. S. Route 119. Items of special interest in this section are the vertical Pennsylvanian beds beneath Pine Mountain fault, Pine Mountain fault (which is well exposed), the St. Louis portion of the "Big Lime" (to be compared with the same unit at Cumberland Gap on the following day's road log), and the character of the "Maxon" and Lee sandstones.
- At the end of this section the north limb of Rocky Face fault (figures 5 and 6) may be seen.
- The busses will pick the party up at this point.
- 12.1 End of Stop No. 1 near bridge over Cumberland River on U. S. Route 119. Go toward Pineville.
- 12.4 Junction of U. S. Route 119 and 25E. Turn right (north).
- 12.6 Lee section. See Appendix I. No stop.
- 13.2 Junction of U. S. Route 25E and Ky. Routes 66 and 221. Turn right (east) and continue through Pineville on Ky. Routes 66 and 221.
- 15.1 Junction of Ky. Routes 66 and 221. Turn right on Ky. Route 221.
- 15.2 Abandoned coke ovens on left. About 75 feet above these ovens are old mines in the Straight Creek coal.

NW.



STOP NO.1, PINEVILLE SECTION
EXPOSURES ALONG L.&N. R.R. SOUTHEAST
EDGE OF PINEVILLE

Figure 4

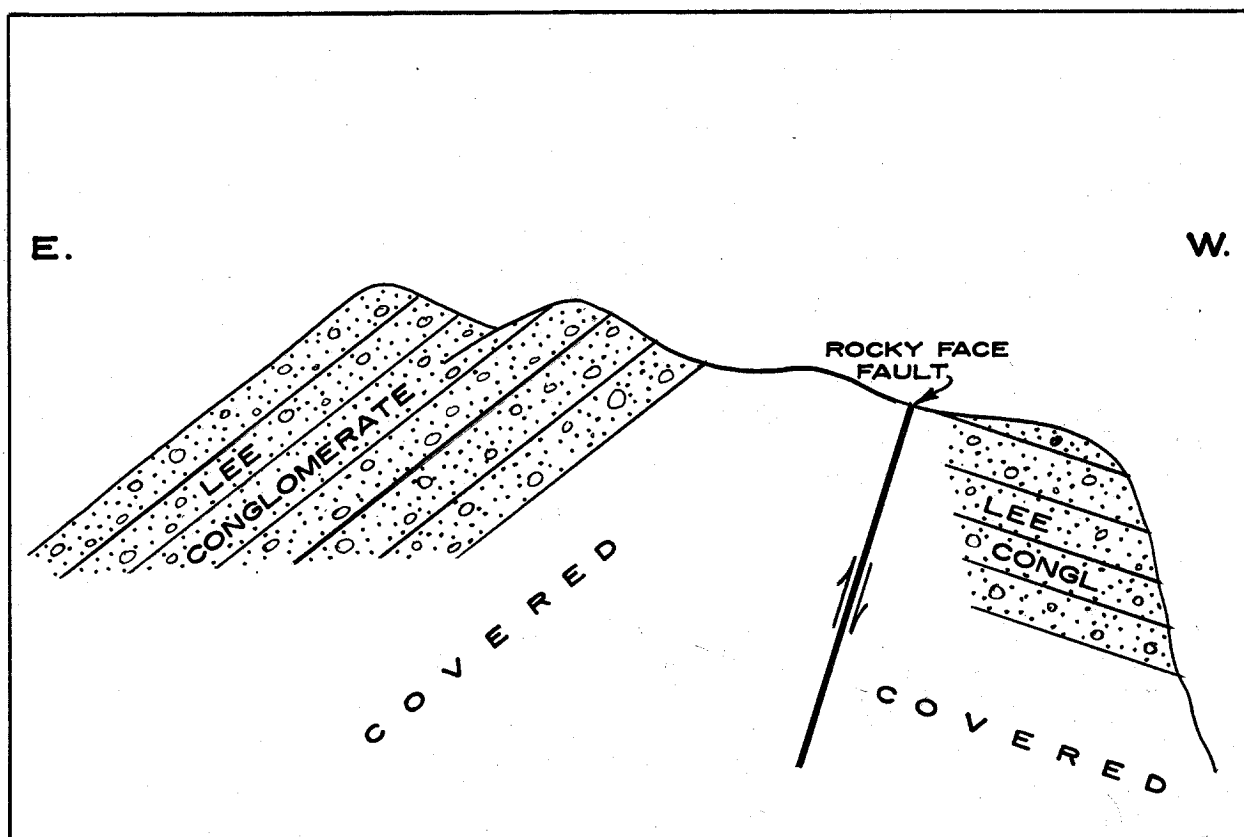
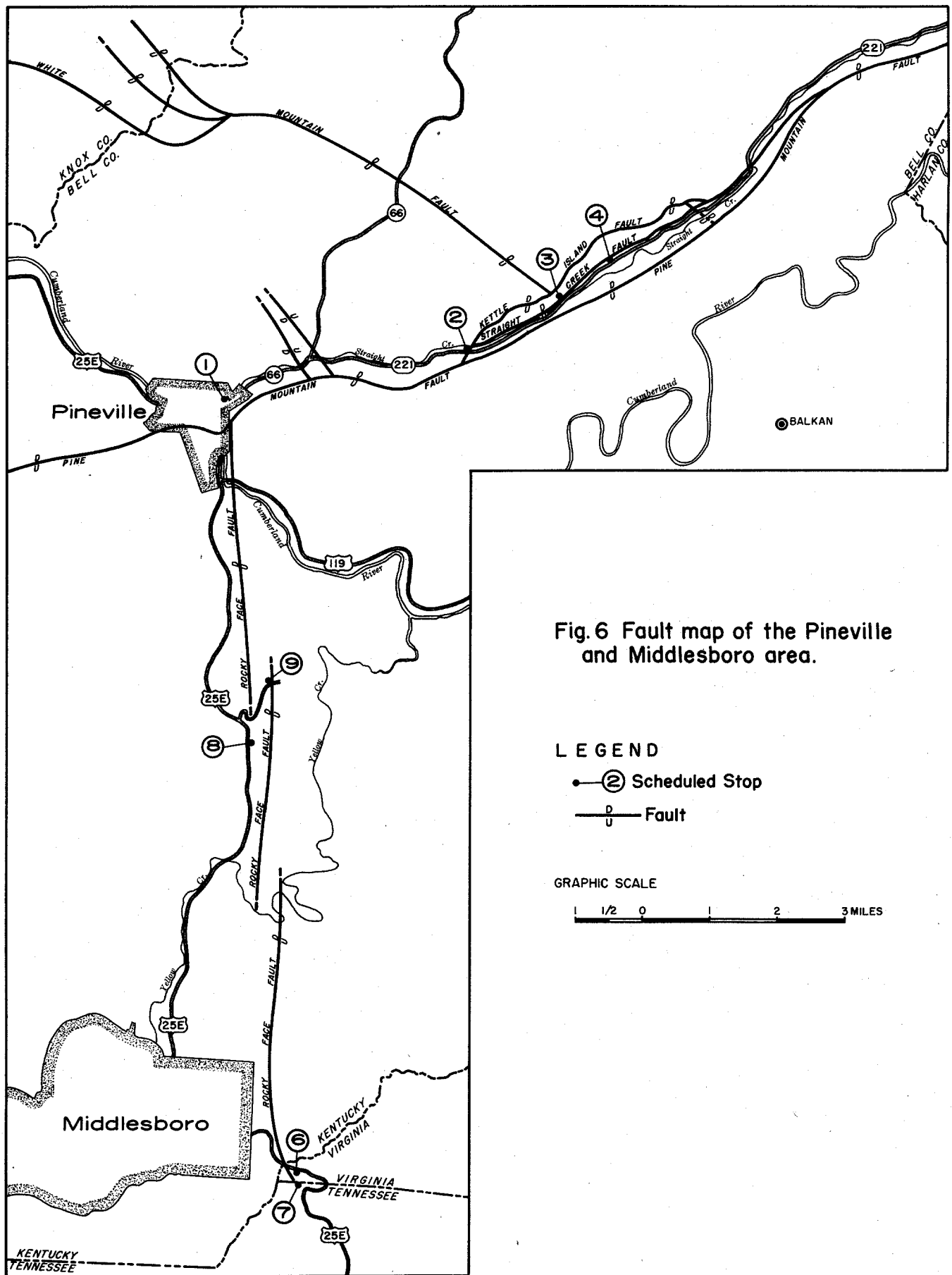


Fig. 5 Sketch of north limb of Rocky Face fault just south of U.S. Route 119, south of Pineville.



- 17.5 STOP NO. 2. See figures 6 and 7. 15 minutes. Lee beds to the right, dipping about 60° , are faulted against the Breathitt formation to the left. This is the western end of the Kettle Island fault on the left and the Straight Creek fault on the right. The Lee conglomerate is in the outermost of the two additional fault blocks in front of the Pine Mountain fault block.
- 19.2 STOP NO. 3. See figures 6 and 8. 15 minutes. Mouth of Kettle Island Branch. Lee conglomerate and a Lee coal in outermost thrust block between Kettle Island fault and Straight Creek fault. Dip here is 61° .
- Turn around and return to Pineville on Ky. Route 221 for lunch.
- 25.2 Pineville Court House Square. Lunch stop. One hour. Return to busses. Continue east on Ky. Route 221.
- 27.1 Junction Ky. Routes 221 and 66. Turn right on Ky. Route 221.
- 31.5 Turn left on gravel road.
- 32.2 STOP NO. 4. See figure 6. 15 minutes.
This abandoned quarry is in the Greenbriar or "Big Lime." The Straight Creek fault, north of this quarry, has brought the limestone up to road level, approximately 2,500 feet above its normal position.
- Continue east on gravel road.
- 32.5 Junction of gravel road and Ky. Route 221. Turn left (east) on Ky. Route 221.
- 33.0 Outcrop of Pennington shales.
- 33.6 Outcrop of Greenbriar limestones.
- 34.1 Sharp curve in road to left and second curve to right. Midway between the two curves the Straight Creek fault crosses the road. Roadcut exposures show Lee faulted against Breathitt. From this point Straight Creek fault continues northeast for approximately $1\frac{1}{2}$ miles before it terminates by intersection with Pine Mountain fault. To the northeast of this point and on the southeast side of Straight Creek a series of low knob-like hills of Lee sandstone at the base of Pine Mountain mark the position of one of the additional fault blocks.
- 35.9 Ritter Lumber Company camp.
- 46.7 To the right of the road the low series of knob-like hills at the base of and parallel to Pine Mountain are indicative of another thrust fault such as seen in Stops 2, 3, and 4. This area has not been completely mapped but on a few of the knobs the Lee conglomerate has been seen at a much higher elevation than it normally should be expected.

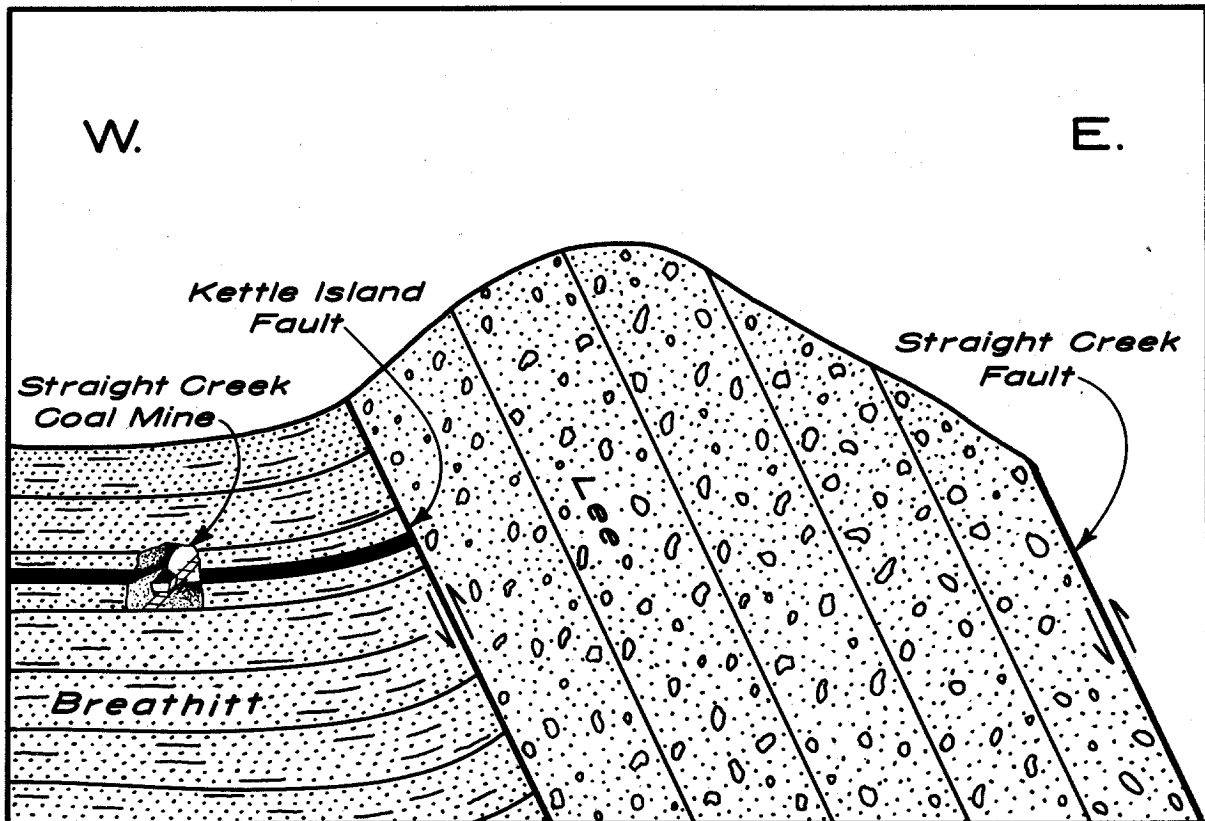


Fig.7 Sketch showing western end of Straight Creek and Kettle Island faults. STOP 2.

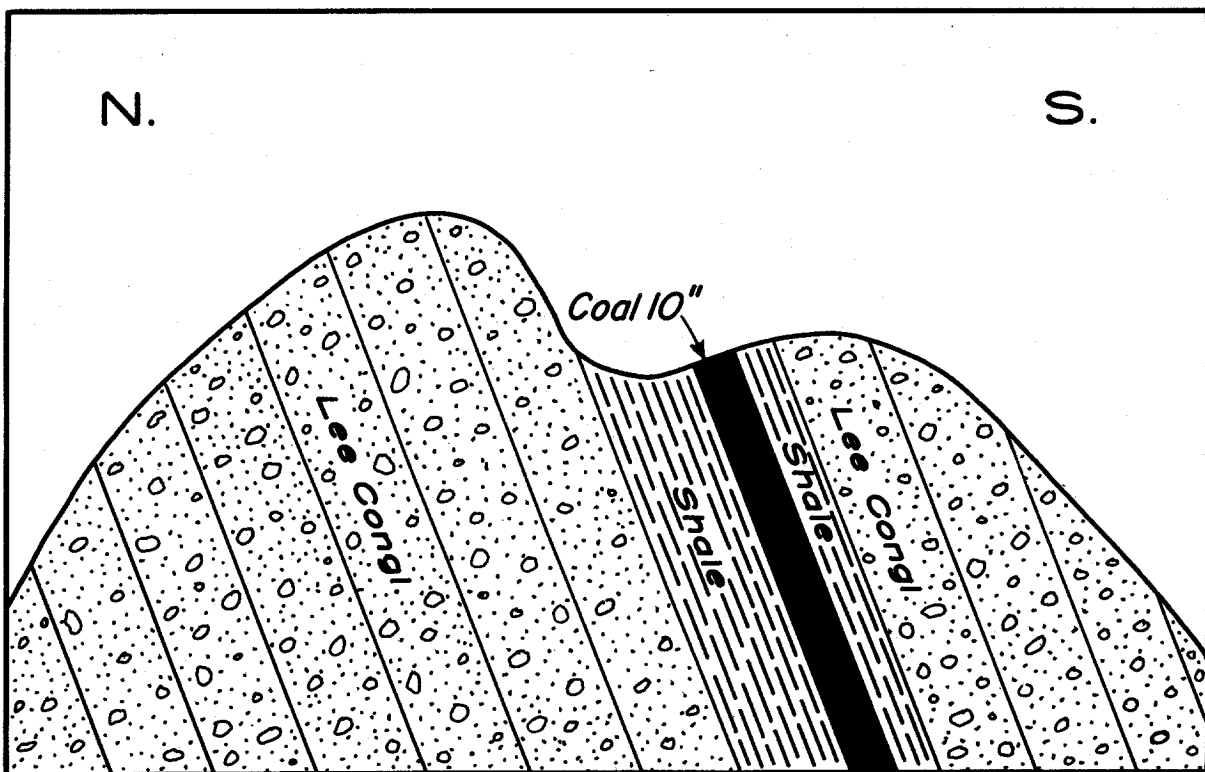


Fig.8 Sketch of rocks exposed at mouth of Kettle Island and Creek. STOP 3.

48.7 Junction of U. S. Route 421 and Ky. Route 221. Turn right (south) on U. S. Route 421.

49.7 STOP NO. 5. See figure 9. Two hours.
Harlan Section. The party will leave the busses at this point and will work up the section. The busses will pick the party up at the top of the hill.

Approximately three miles north of this section the Lowry Oil Company drilled a well on the Intermountain Coal and Lumber Company property. Due to the fact that the upper part of the Mississippian section is covered, the sample descriptions on the Mississippian portion of this well are included in Appendix II of this guidebook.

55.5 Junction U. S. Route 421 and Ky. Route 413. Turn left.

55.6 Junction U. S. Route 421 and U. S. Route 119. Turn right on U. S. 119 and continue on this route.

77.9 On left across Cumberland River outcrop of Upper Lee forms what is known locally as the "Seven Sisters."

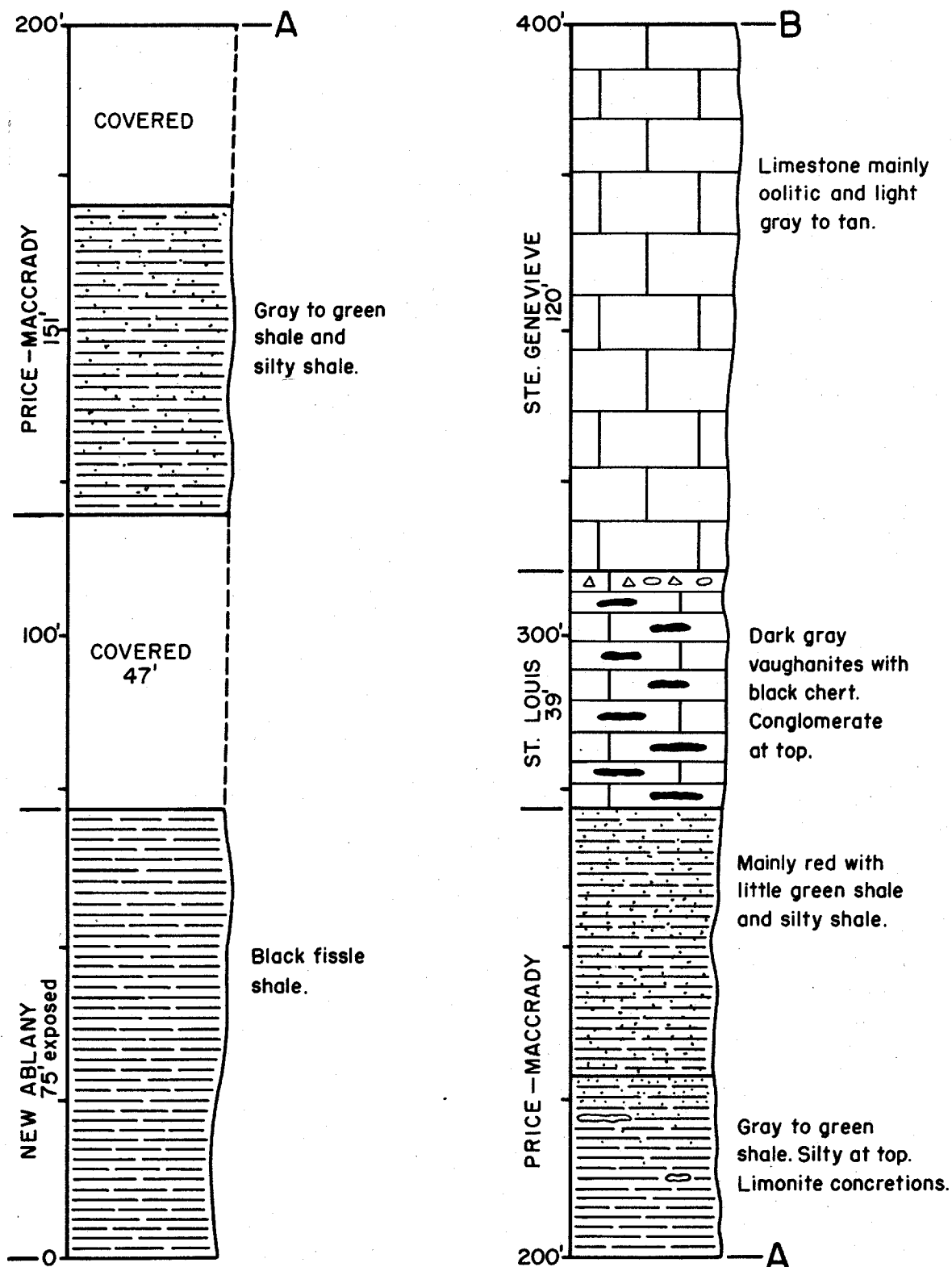
86.1 Junction U. S. Routes 119 and U. S. 25E south of Pineville. Turn left (south) on U. S. Route 25E.

96.5 Stop light. Junction U. S. Route 25E and Ky. Route 186 at Middlesboro. Turn right.

96.9 Middlesboro Hotel, Middlesboro.

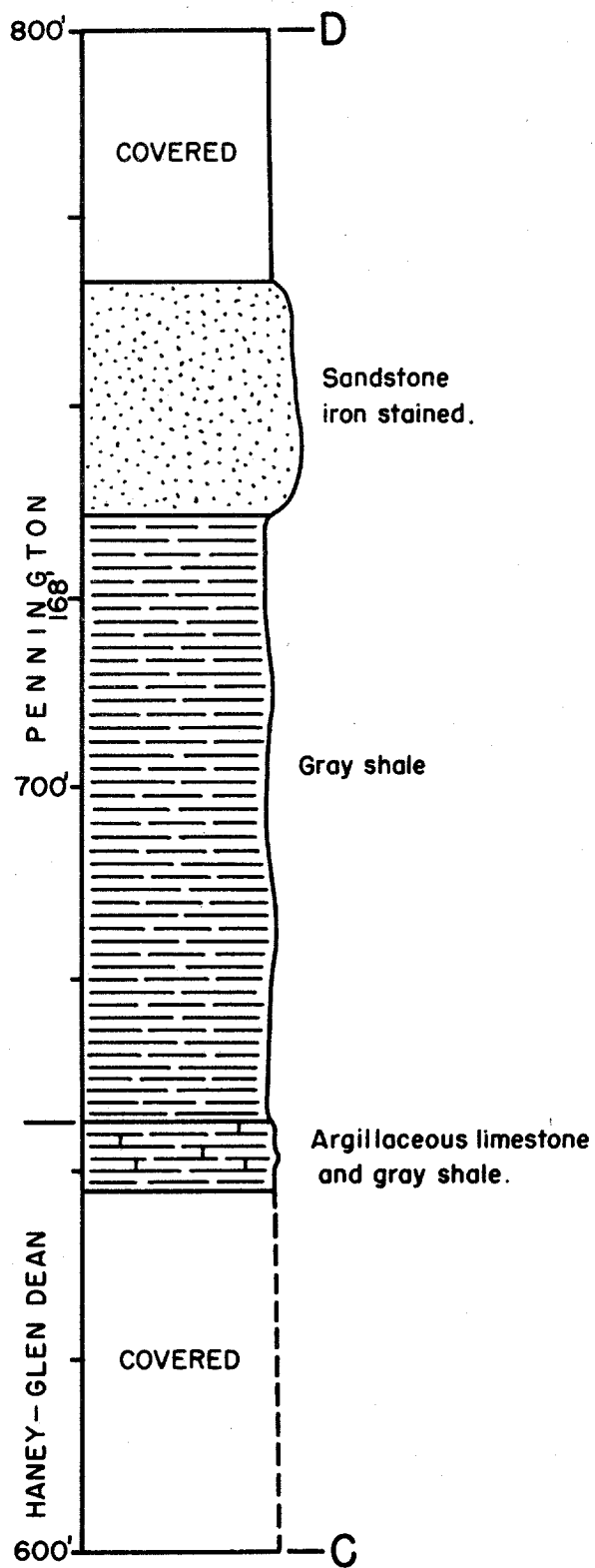
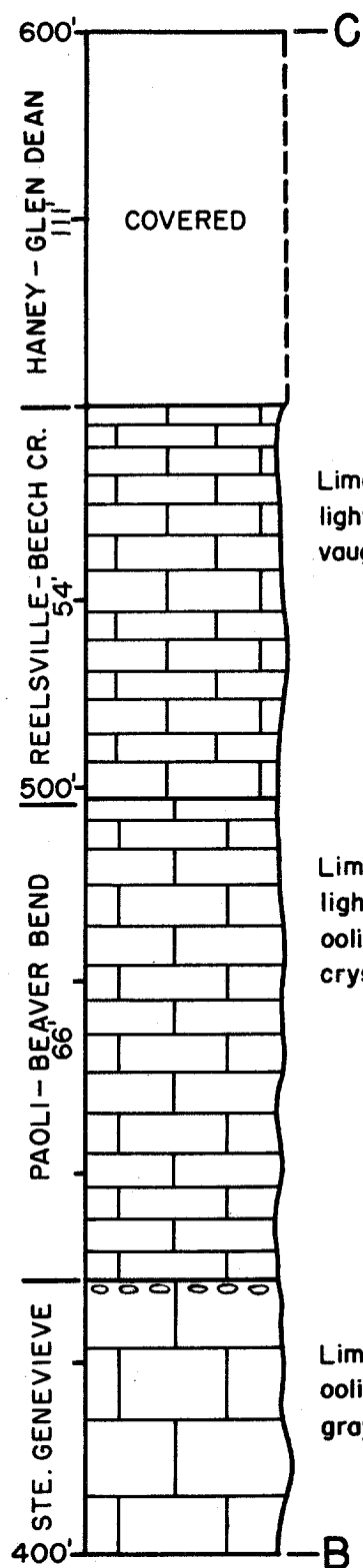
This completes the first day of the field trip.

Fig. 9
Harlan Section
Pine Mountain along U.S. Route 421 north
of Harlan

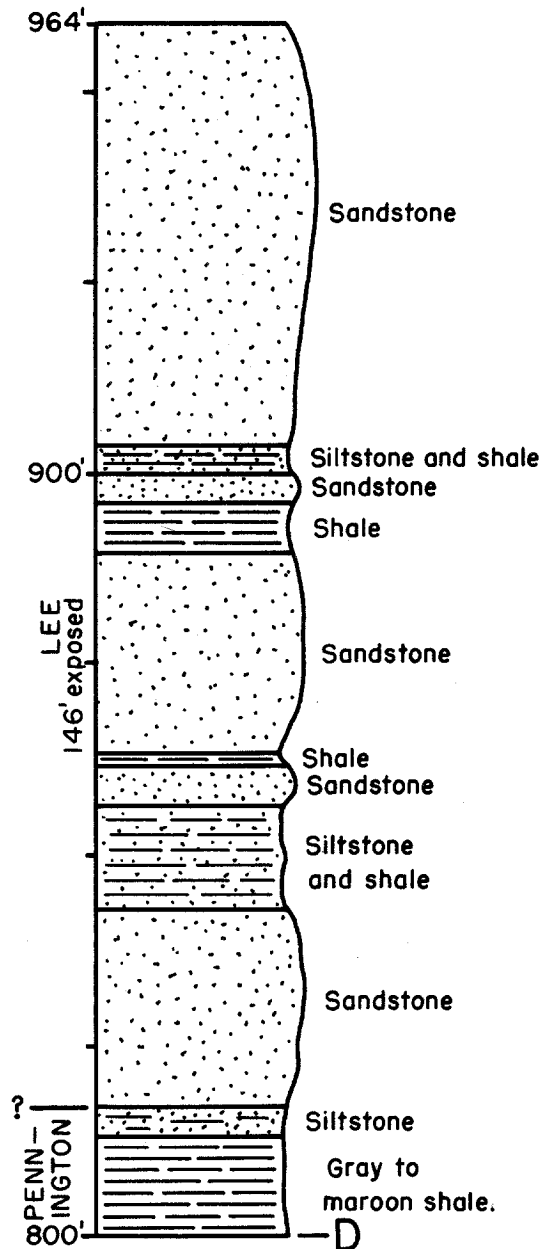


STOP 5

Harlan Section, cont.



Harlan Section, cont.



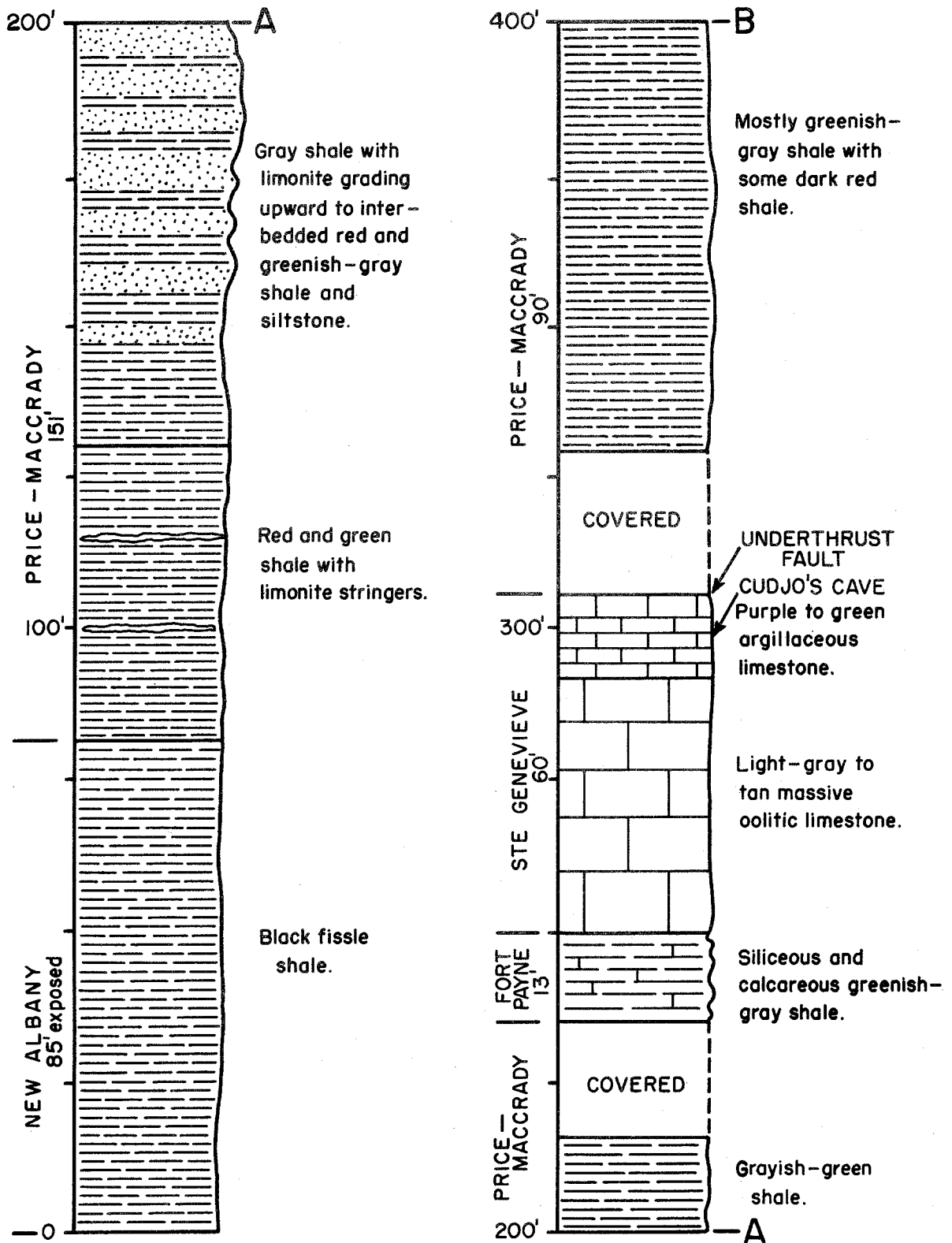
Saturday, April 27, 1957

Assembly point.--The caravan (private transportation) will assemble at the corner of Cumberland Avenue and Sixteenth Street in Middlesboro. This is three blocks east of the Middlesboro Hotel.

Mileage

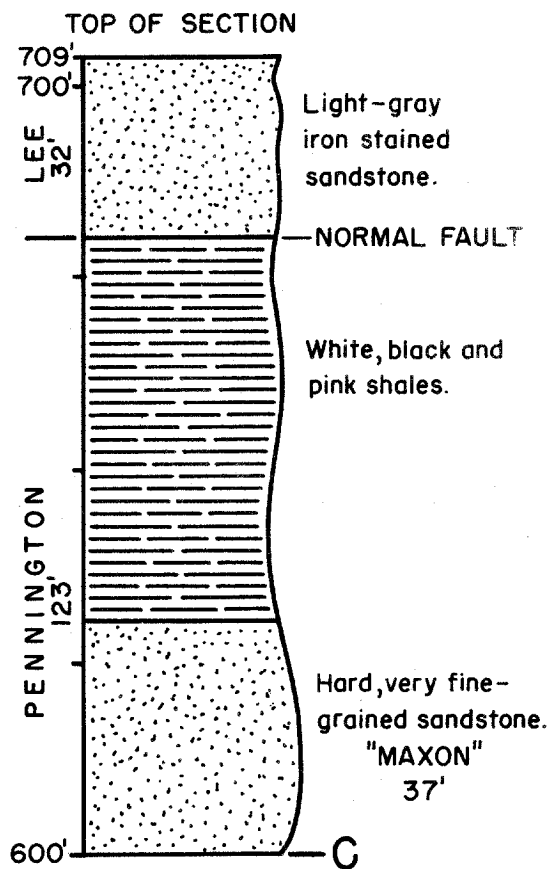
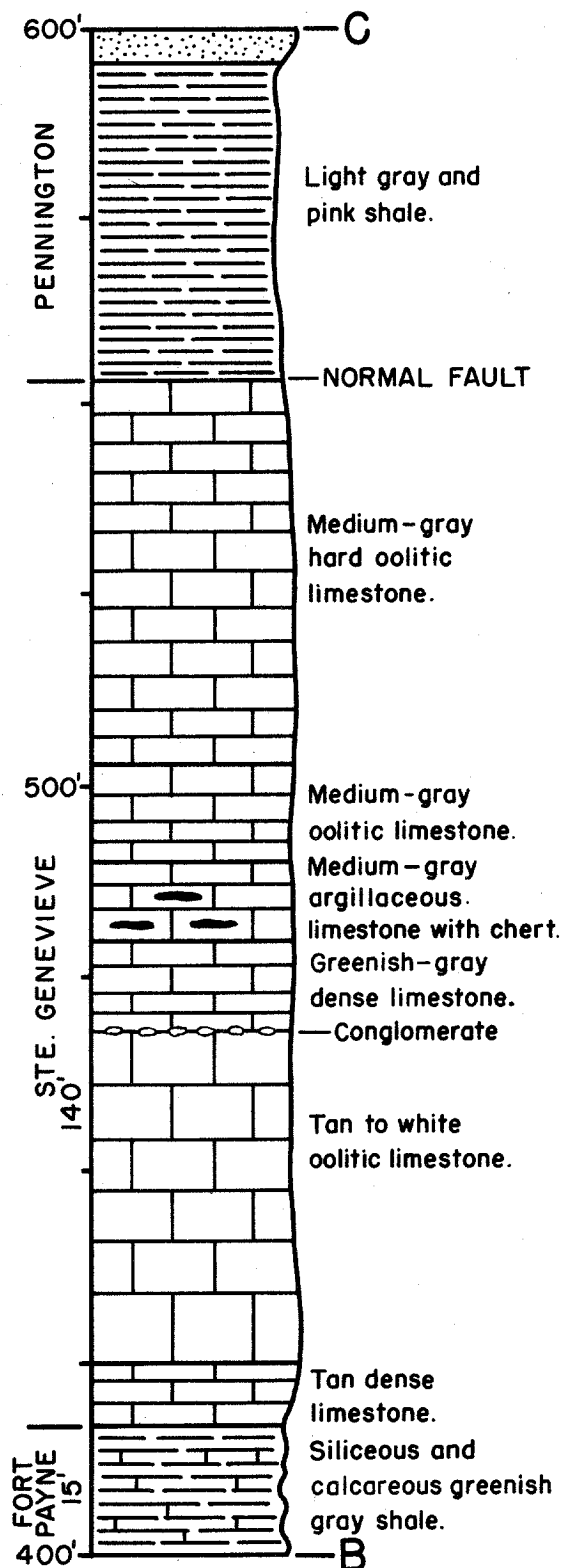
- 0.0 Starting point is corner of Cumberland Avenue and Sixteenth Street in Middlesboro, Kentucky. Go east on Cumberland Avenue, Ky. Route 186.
- 0.3 Stop light. Junction of U. S. Route 25E and Cumberland Avenue. Turn right (south) on U. S. Route 25E.
- 0.4 Entrance to Cumberland Gap National Historical Park. Lower Breathitt exposed on right just beyond Park entrance.
- 1.3 Foot of Cumberland Mountain. Lee formation crops out intermittently from this point to top of mountain.
- 2.5 Kentucky-Virginia State line. Entrance to National Park road to "The Pinnacle" on left.
- 2.7 STOP NO. 6. Cumberland Gap Section. See figure 10. One and one-half hours. This section was measured from the junction of U. S. Routes 58 and 25E northward on U. S. Route 25E to the top of the roadcut at the entrance road to "The Pinnacles." The party will leave the cars and walk to the foot of the hill and work back up the section.
- 3.1 Junction of U. S. Routes 58 and 25E. Stay on U. S. Route 25E.
- 3.4 Turn right on street to railroad depot at town of Cumberland Gap, Tennessee.
- 3.7 STOP NO. 7. See figure 11. 25 minutes. At this point, if one faces northeast, the structural relations of the Stop No. 6 may be seen, especially the under-thrust near Cudjo's Cave. Just across the railroad to the northeast (see figure 12) the "Big Lime" has been faulted down to this lower level, indicating a fault (south limb of Rock Face) that strikes approximately northwest and passes through Cumberland Gap. Near the entrance to the railroad tunnel may be seen the crumpled New Albany or "Brown" shale, probably just a little above the Pine Mountain thrust. Near the railroad station may be seen one of the abandoned iron furnaces which were so important in the development of the city of Middlesboro. Return to the cars and leave by the same route as was entered.
- 4.0 Junction of street to depot and U. S. Route 25E. Turn left on U. S. Route 25E. Continue north on this highway through Middlesboro.

Fig. 10
Cumberland Gap Section



STOP 6

Cumberland Gap Section, cont.



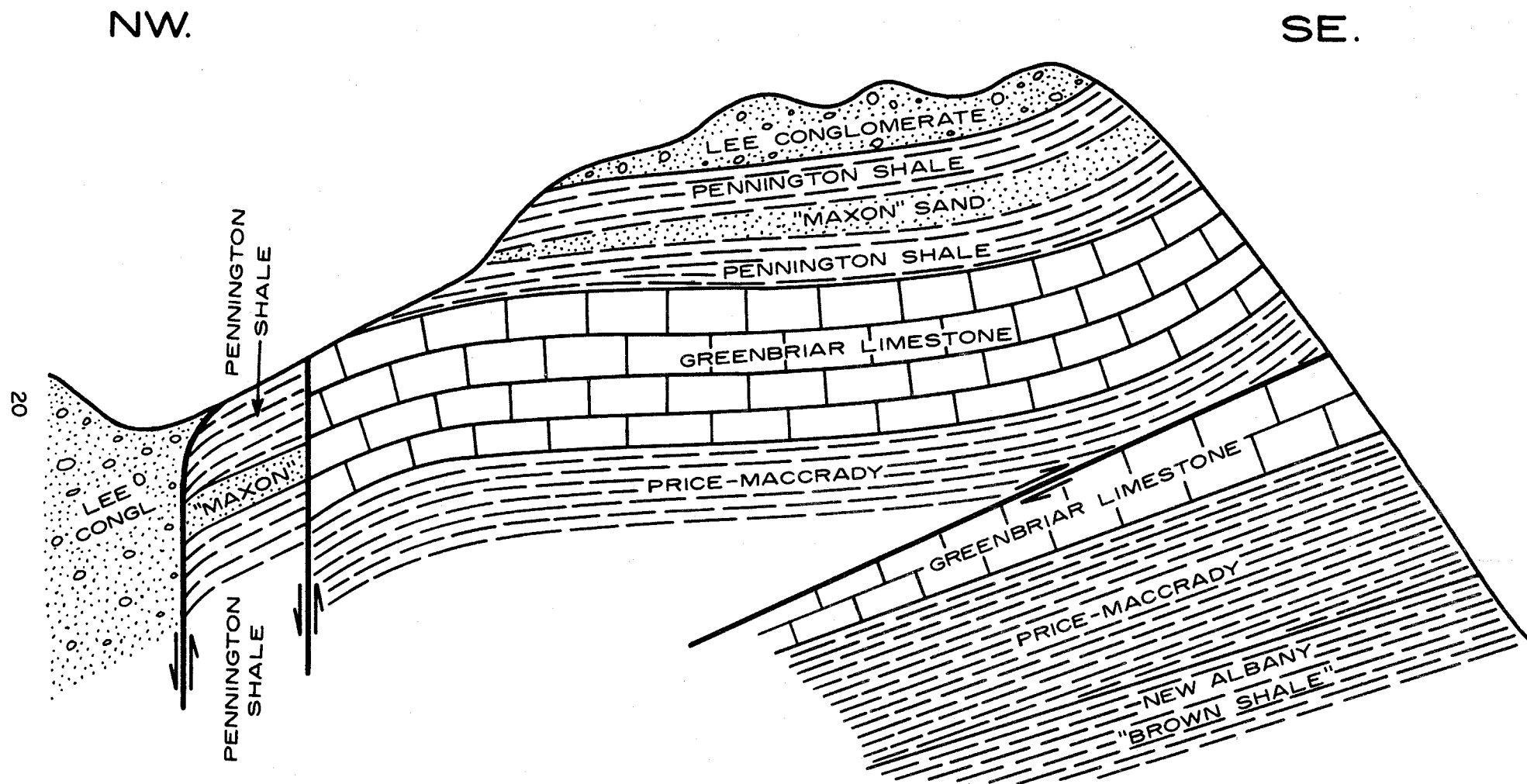


Fig. II Stratigraphic and structural profile of Cumberland Mountain at Cumberland Gap.

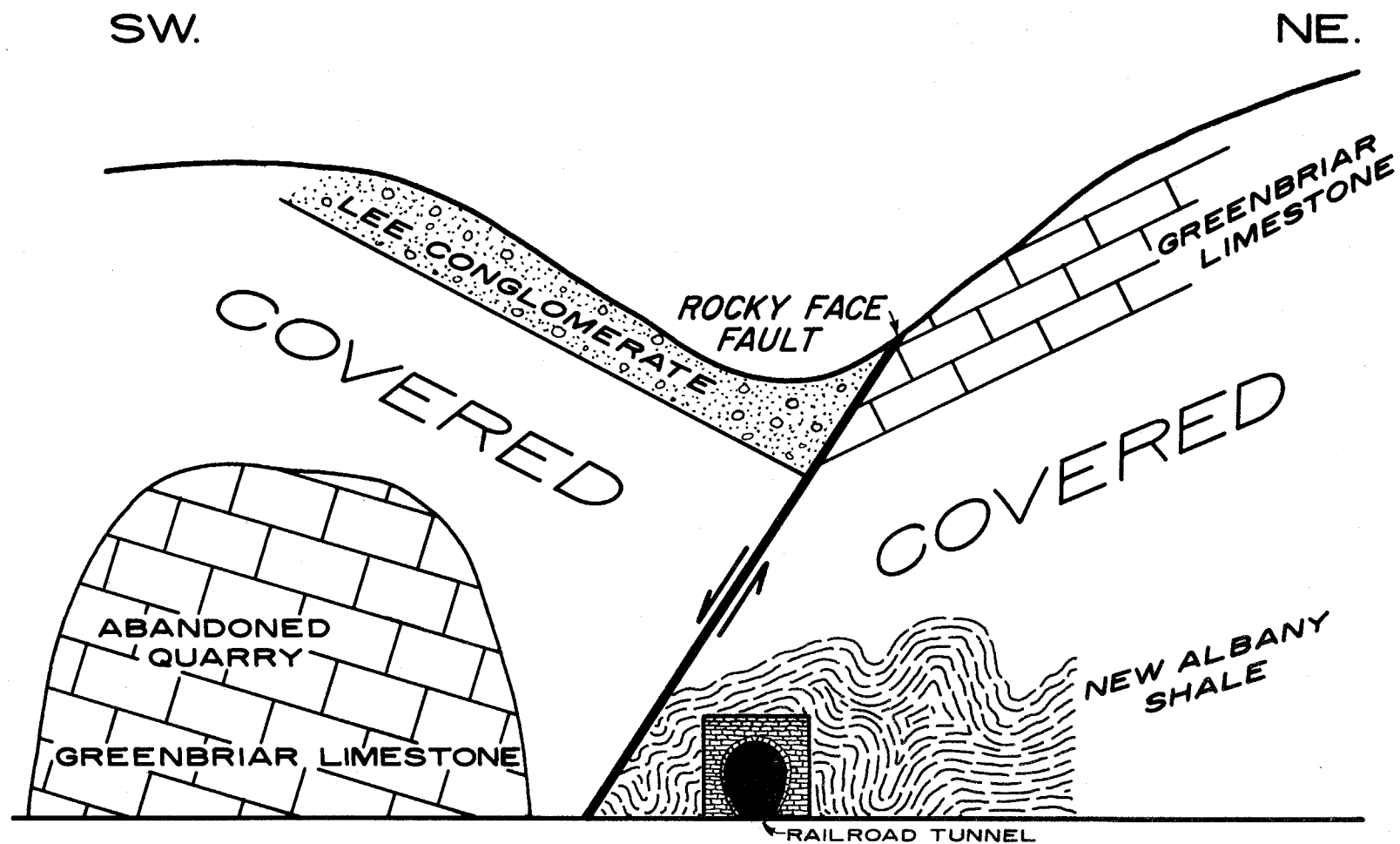


Fig. 12 Sketch of south limb of Rocky Face fault
as viewed at Cumberland Gap, Tenn.

STOP 7

- 9.2 Coal outcrop on right is the Turner (?) coal.
- 13.4 STOP NO. 8. See figure 6 and figure 13. 10 minutes. The fault to the east of and parallel with the highway is "Rocky Face" fault. This normal fault is the middle one of three en eschelon faults that trend northwest-southeast at right angles to the Pine Mountain thrust. The southernmost of these faults passes through Cumberland Gap and the northern fault passes through Pine Mountain at the gap at Pineville. Just east of this fault the Benedum-Trees Co. drilled a well on the Hurst property. Sample descriptions on this well may be found in Appendix III.
- Return to cars and continue north on U. S. Route 25E.
- 13.6 Turn right on road just beyond Pan-Am service station.
- 14.5 STOP NO. 9. See figure 14. 30-second pause. Admittedly this is a bad stop since the cars cannot be parked. If the cars will each pause momentarily at this curve and each person will look directly ahead the drag zone of Rocky Face fault may be seen.
- 14.9 Turn around. Please use caution at this point. Each car must turn here and the drivers are requested to allow ample operating room for the car ahead. The party will return from the direction in which it came.
- 16.2 U. S. Highway 25E.
- This concludes the field trip.

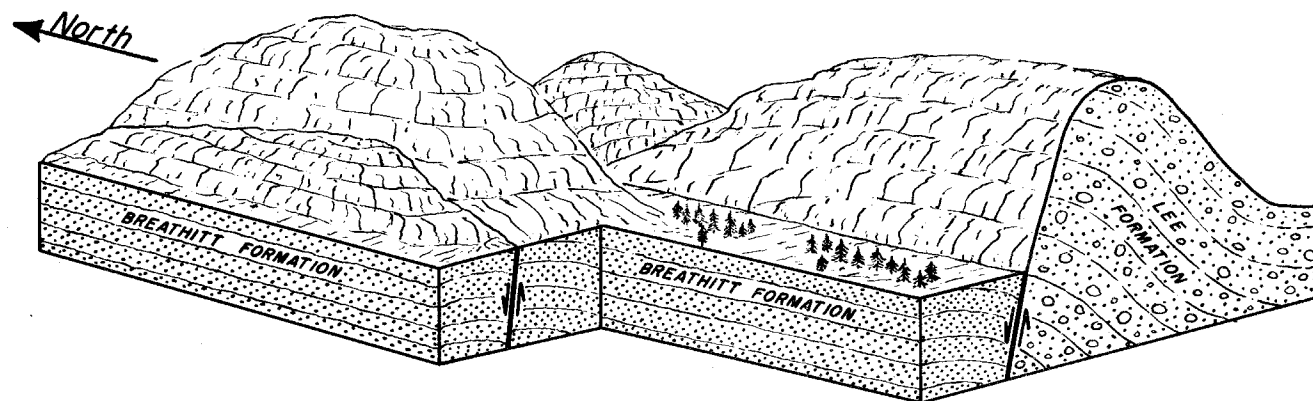


Fig.13 Block diagram of center and north limbs of
Rocky Face fault between Middlesboro and Pineville.
STOP 8

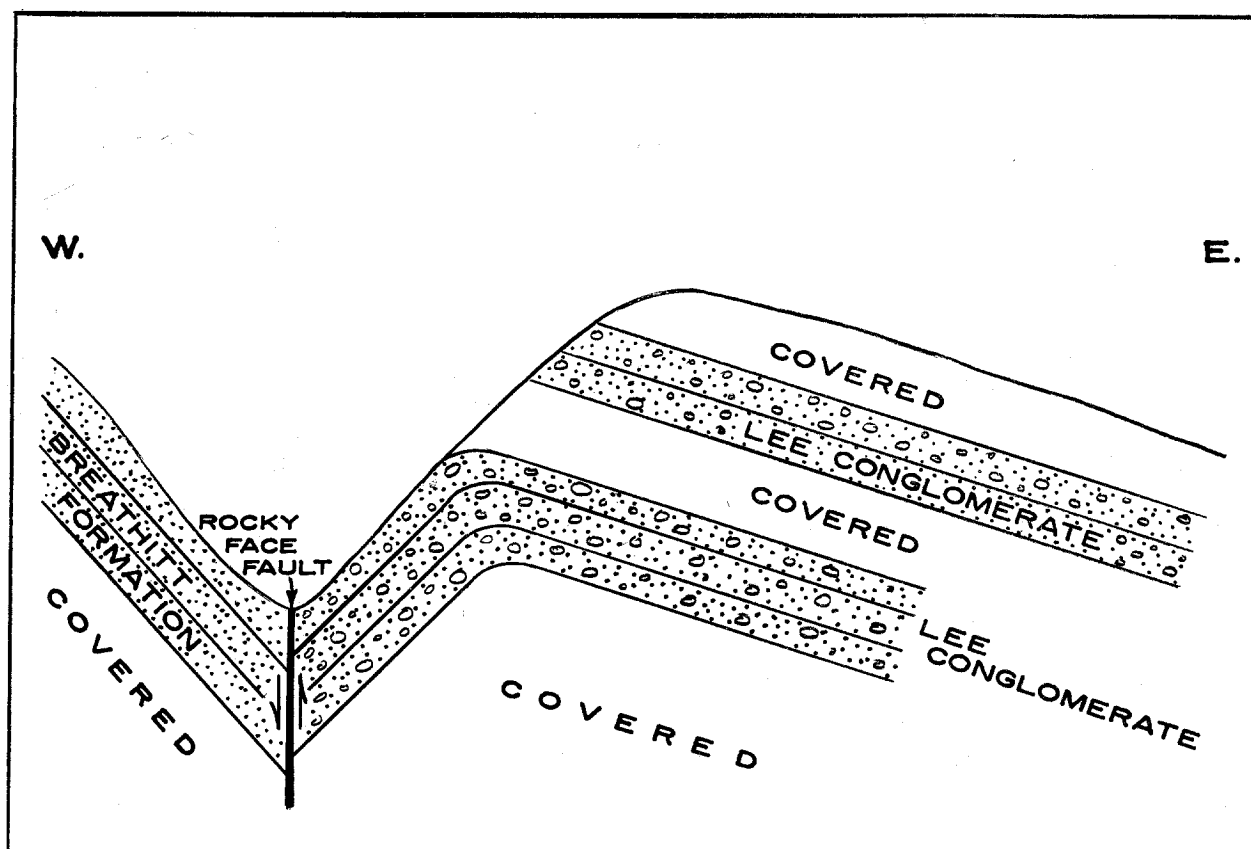


Fig.14 Sketch of drag zone on center limb of Rocky Face fault north of Middlesboro.

GEOLOGICAL SOCIETY OF KENTUCKY GUIDEBOOKS

(Available from Kentucky Geological Survey, Lexington, Ky.)

- 1952 Chester Formations of Crawford and Perry Counties, Indiana, and Breckinridge County, Kentucky, by Preston McGrain
- 1953 Guide to Some Pennsylvanian Sections in Morgan, Magoffin, and Breathitt Counties, Kentucky, by J. W. Huddle
- 1954 Geology of the Mammoth Cave Region, Barren, Edmonson, and Hart Counties, Kentucky, by Preston McGrain and F. H. Walker
- 1955 Exposures of Producing Formations in Northeastern Kentucky, by R. N. Thomas and others
- 1956 Selected Geologic Features of Southwestern Kentucky, by L. M. MacCary and T. W. Lambert

APPENDIX I

Log Mountain Section

Section begins at top of roadcut of U. S. Route 25E on Log Mountain, continues north along highway toward Pineville for approximately 3 miles, and ends in L. & N. Railroad cut near Pineville at the top of the "Big Lime" (Greenbriar). Measured by Robert E. Hauser.

<u>Description</u>	<u>Feet</u>	<u>Inches</u>
Shale, medium-gray, silty, stringers of ironstone, top 6 feet interbedded with siltstone	18	0
Concealed interval	93	0
Siltstone, gray, shaly, medium-grained, thinly bedded	12	0
Sandstone, light-brown, fine-grained, massive	4	0
Coal	1	9
Underclay, light-gray	3	0
Sandstone, light-gray, fine-grained	1	8
Shale, light-gray, silty	6	0
Coal bloom	0	5
Underclay, light-gray	1	8
Concealed interval	90	0
Sandstone, light-brown, fine-grained, friable, thinly bedded at top	24	0
Shale, light-gray, stringers of siltstone	11	0
Concealed interval	8	0
Shale, lower portion dark-gray, grades upward into light-brown, pencil fracture, ironstone nodules	26	0
Sandstone, light-gray, fine-grained	1	8
Shale, silty, light-gray, thinly bedded	1	6
Sandstone, medium-brown, very fine-grained, massive	3	0
Shale, gray, silty	6	0

Log Mountain Section
(cont.)

	<u>Feet</u>	<u>Inches</u>
Coal	1	1
Shale, medium-gray, ironstone nodules, fissile	18	0
Sandstone, light-brown, fine-grained	2	0
Concealed interval	24	0
Siltstone, light-brown, thinly bedded, shaly at top	12	0
Coal bloom	0	8
Underclay, medium-gray	0	10
Siltstone, light-brown, shaly, ironstone stringers	6	0
Shale, black, carbonaceous, coaly	0	5
Shale, black	2	6
Coal	0	8
Shale, black, fissile	1	6
Sandstone, light-gray, very-fine grained, micaceous, carbonaceous streaks, thinly bedded	27	0
Shale, medium-gray, fissile, stringers of ironstone, pencil fracture	26	0
Sandstone, light-brown, very fine-grained, micaceous, thinly bedded	6	0
Shale, dark-gray, stringers of ironstone, fissile, pencil fracture	36	0
Concealed interval	18	0
Shale, medium-gray, silty, micaceous	28	0
Sandstone, light-gray, fine-grained, micaceous, cross-bedded, thick-bedded	7	0
Shale, medium-gray, silty, micaceous, thinly bedded	10	0
Concealed interval between foot of Log Mountain and entrance to Pine Mountain State Park, est.	250-300	
Sandstone, light-gray to brown, fine- to medium-grained, cross-bedded, heavily bedded, top of Lee cong.	86	0

Log Mountain Section
(cont.)

	<u>Feet</u>	<u>Inches</u>
Shale, dark gray, silty, micaceous	27	0
Sandstone, gray, medium-grained, massive	9	0
Coal, pinched out leaving only two short exposures	2	6
Shale, dark-gray, hard, fissile, micaceous	4	0
Sandstone, light-gray, medium-grained, medium-bedded	41	0
Shale, dark-gray, silty, micaceous, ironstained	42	0
Sandstone, white to pink, medium-grained, massive, coal streaks in lower portion	82	0
Shale and sandstone interbedded, dark-gray, micaceous	9	0
Sandstone, light-gray, fine-grained, medium- to heavily bedded, micaceous, some cross-bedding	135	0
Shale, dark-gray, silty, micaceous, ironstone nodules in top portion	45	0
Sandstone, light-gray, fine-grained, medium-bedded, cross-bedded	67	0
Shale, light-gray, arenaceous, carbonaceous, streaks of bluish-gray sandstone	6	0
Sandstone, light-gray, medium- to very coarse-grained, massive, contains quartz pebbles up to 1 inch in diameter	78	0
Sandstone, white to reddish-brown, medium-grained, thinly bedded	9	0
Concealed interval, estimated	175	0
Sandstone, reddish-brown to white, fine-grained, hard, quartzitic, massive	215	0
Shale and siltstone interbedded, light-brown, thinly bedded	15	0
Concealed interval (Penn.-Miss. contact)	55	0
Sandstone, white, fine-grained, well indurated (Maxon)	26	0
Concealed interval to top of "Big Lime"	40	0

APPENDIX II

Sample Descriptions of part of the
Lowry Oil Co. No. 2 Intermountain Coal and Lumber Co.,
in 24-F-75, Harlan County, Ky.

Descriptions by Emmett Greenfield, Department of
Geology, University of Kentucky

PENNSYLVANIAN

Lee

2600-2615 Sandstone, white to light brownish-orange, medium- to coarse-grained with many very coarse quartz fragments included.

PENNSYLVANIAN OR MISSISSIPPIAN

2615-2685 Sandstone, light-gray to light grayish-brown, medium- to coarse-grained, sub-angular, finely-micaceous with streaks of shale.

2685-2725 Sandstone, white, medium- to coarse-grained, sub-angular, with interbedded dark-gray, finely-micaceous shale.

2725-2805 Sandstone, white, medium-grained, sub-angular to sub-rounded, with streaks of dark-gray soft shale.

MISSISSIPPIAN

Pennington

2805-2865 Shale, smooth, dark-gray, soft, dark spotted with interbedded sandstone.

2865-2885 Dolomite, brownish-gray, fine crystalline, slightly argillaceous, very slightly calcareous with interbedded medium dark-gray soft shale.

2885-2895 Samples missing.

2895-2897 Shale, reddish-gray to gray to greenish-gray, silty.

Greenbriar

2897-3000 Limestone, oolitic, medium yellow-brown, very fine crystalline, slightly crinoidal, with some medium and large round oolites and streaks of grayish-green shale and silt, with traces of bluish-white vitreous translucent chert. Grades downward into: limestone, oolitic, yellowish-gray, micro-crystalline, slightly dolomitic, with streaks and thin beds of yellowish-gray to pale yellow orange, fine-crystalline dolomite. Oolites are small to medium, round, flattened, in part.

- 3000-3030 Limestone, oolitic, yellowish-gray to pale yellowish-brown, very fine crystalline, with some medium, round, well developed oolites. Little bluish-white, vitreous, transparent chert.
- 3030-3045 Limestone, as above except slightly dolomitic in part.
- 3045-3090 Limestone, oolitic, yellowish-brown, very fine crystalline with very large rounded and slightly flattened oolites. Near base interbedded with light brownish-gray, fine crystalline dolomite and yellowish-gray, microcrystalline, oolitic limestone.
- 3090-3105 Limestone, oolitic, white to pale yellowish-brown, very fine crystalline, coarse textured with large well developed oolites.
- 3105-3121 Dolomite, light brown, fine crystalline, with interbedded very pale orange, fine to medium crystalline oolitic, crinoidal limestone and little reddish-brown, vitreous, transparent chert.
- 3121-3150 Limestone, grayish-orange to pale yellowish-brown, very fine to fine crystalline, slightly dolomitic, slightly oolitic (oolitic in thin beds).
- 3150-3173 Dolomite, yellowish-gray to pale olive, medium crystalline, non-calcareous with streaks of yellowish-gray microcrystalline oolitic limestone.
- Fort Payne
- 3173-3185 Dolomite, argillaceous or dolomitic shale, brownish-gray to light olive gray, fine crystalline with streaks of light olive gray siltstone and gray shale.
- Price-Maccrady
- 3185-3255 Shale, medium red to reddish-gray, finely micaceous, with streaks, to interbedded reddish-gray to medium dark gray argillaceous silt or silty shale.
- 3255-3300 Shale, dark gray, finely micaceous, slightly silty in part with few siderite nodules.
- 3300-3365 Shale, reddish-brown, finely micaceous, slightly silty with interbedded shale as above and streaks of light gray, coarse silt.
- 3365-3473 Shale, dark-gray, finely micaceous with siderite nodules and streaks of light gray, coarse silt.

MISSISSIPPIAN-DEVONIAN

New Albany

- 3473-3620 Shale, gray-black to black, pyritic in part with few small brown spores.
- 3620-3842 Same with streaks of light olive-gray fine to medium silt with much silt toward base.
- 3842 Top of Devonian limestone.
- 4005 Total depth. Well stopped in "Corniferous."

APPENDIX III

Sample Descriptions of the
Benedum-Trees Oil Co. No. 1 L. B. Hurst,
in Cent. NE 21-C-70, Bell County, Ky.

Descriptions by Thomas R. Pierce, Tennessee Division of Geology

0-1510	No samples
PENNSYLVANIAN	
Lee	
1510-1526	Sandstone, black to gray, silty and argillaceous.
1526-1538	No samples.
MISSISSIPPIAN	
Pennington	
1538-1550	Shale, maroon, with little loose sand.
1550-1574	Same, with traces of green silty shale and varicolored limestone.
1574-1585	Same, with much white clear quartz.
1585-1595	Limestone, tan to brown to white mottled, very fine crystalline with little coarse crystalline.
1595-1605	Limestone, very argillaceous.
1605-1623	Shale, maroon.
1623-1665	Limestone and shale, varicolored.
1665-1820	Sandstone, fine to very fine.
1820-1828	Same, argillaceous.
1828-1939	Shale, gray, micaceous with quartzitic sandstone.
1939-1961	Same with very fine grain, tan, oolitic limestone.
1961-1972	Sandstone, tan, dolomitic.
1972-1990	Same with tan to brown, oolitic limestone.
1990-1996	Dolomite, tan, very fine grain, crystalline with gray dolomitic shale.
1996-2016	Shale, hard, brown to black with tan sub-translucent chert.

2016-2046 Shale, black, micaceous, with traces of lavender chert.

Greenbriar

2046-2062 Limestone, brown to tan mottled, coarse crystalline.

2062-2080 Limestone, oolitic in part.

2080-2091 Limestone, brown, dense, very fine crystalline with trace of tan chalky limestone.

2091-2140 Limestone, tan, dense, fossiliferous and some oolitic.

2140-2150 Same, with trace of green quartzitic sandstone.

2150-2170 Same, no sandstone.

2170-2180 Same, with some dark brown oolitic.

2180-2185 Limestone, tan, very fine crystalline, slightly sucrosic.

2185-2195 Limestone, tan to brown mottled, dense, with some oolitic and coarse crystalline.

2195-2233 Same, contains some dark brown pellets.

2233-2260 Limestone, tan to brown, mottled, argillaceous, and gray calcareous shale.

2260-2282 No samples.

2282-2310 Limestone, tan, fine crystalline, slightly sucrosic, with some dark gray argillaceous limestone.

2310-2322 Limestone, tan to brown, medium to coarse crystalline.

2322-2330 Limestone, tan to brown, dense, fine crystalline with traces of coarse crystalline, gray, argillaceous, limestone.

2330-2342 Same, with traces of light brown, sub-translucent chert.

2342-2365 Limestone, brown, coarse crystalline, fossiliferous with gray to brown sucrosic dolomite. Argillaceous in part.

2365-2382 Limestone, tan, very oolitic. Oolites very coarse in part.

2382-2413 Limestone, tan, fine crystalline, sucrose.

2413-2475 Same, oolitic in part.

2475-2576 Limestone, tan, dense, sucrose; oolitic in part.

2576-2607 Limestone, light tan to white, powdery and oolitic; crinoidal.

2607-2633 Limestone, light gray to brown, sucrose.

2633-2638 Limestone, light tan, sucrose, with trace of gray to green dolomite.

2638-2642 Same with light gray chert.

2642-2652 Dolomite, brown to tan, fine crystalline, sucrose.

2652-2661 Same with trace of dark gray shale.

2661-2671 Limestone, dark brown, argillaceous in part.

Price-Maccrady

2671-2800 Siltstone, gray to green and red, slightly dolomitic. Little chert in upper 10 feet. Glauconite in upper 3 feet.

2800-2830 Siltstone, gray, argillaceous.

2830-2912 Shale, gray to red in part, siliceous.

MISSISSIPPIAN-DEVONIAN

New Albany

2912-3146 Shale, black, fissile.

SILURIAN

Rockwood

3146-3169 Shale, black with brown siliceous dolomite, slickensided.

3169-3185 Shale, gray to green, siliceous, with brown chert and brown dolomite.

3185-3208 Sandstone, tan, silty.

3208-3225 Shale, gray-brown, soft.

3225-3256 No samples.

3256-3304 Shale, gray-brown, soft.

3304-3374 Sandstone, silty, green, glauconitic, quartzitic.

3374-3384 No samples.

ORDOVICIAN

Sequatchie

- 3384-3526 Shale, dark red to maroon in part, micaceous.
- 3526-3593 Same, with loose silty sand.
- 3593-3605 Same, with trace of gray, medium crystalline limestone.
- 3605-3630 Same, with tan, dense, fine crystalline limestone.
- 3630-3650 Shale, dark red to maroon, micaceous.
- 3650-3740 Shale, red to green to gray, with varying amounts of sandstone and limestone.
- 3740-3760 Shale, red to green with tan, dense, granular limestone with brown specks.
- 3760-3858 Limestone, fine crystalline, with maroon to gray-green shale.
- 3858-3874 Samples missing.

Chickamauga Unit No. 4.

- 3874-3900 Limestone, gray to white mottled, argillaceous, fossiliferous, with gray limy shale.
- 3900-3947 Limestone, gray to white mottled, argillaceous, crystalline.
- 3947-3985 Same, with gray-green, siliceous and limy siltstone.
- 3985-4147 Same, with gray, slightly limy and silty shale.
- 4147-4203 Same, with medium to coarse crystalline limestone. Trace of gray-brown sub-translucent chert at 4185.
- 4203-4311 Same with brown fine to medium crystalline limestone. Trace of brown dense chert at 4229.
- 4311-4340 Samples missing.
- 4340-4413 Limestone, gray to white mottled, argillaceous, crystalline, and brown, fine to medium crystalline.
- 4413-4652 Limestone, argillaceous in part.
- 4652-4682 Limestone, gray-brown, very fine crystalline, dense, slightly argillaceous.

Chickamauga Units No. 1, 2, and 3.

4682-4714	Limestone, brown, very fine crystalline, dense, with pale green bentonite and dark brown dense chert.
4714-4729	Limestone, brown, very fine crystalline, dense, with light tan earthy dense limestone.
4729-4747	Same with little dolomite. Argillaceous in part.
4747-4932	Same with brown-gray dense limestone.
4932-4959	Same with brown fine crystalline dolomite.
4959-5508	Limestone, brown, very fine crystalline, dense with varying amounts of dolomite and shale. Samples missing from 5326, 5356, 5376-5388, 5447-5470, 5485-5508.
5508-5535	Same with cream brown, dense limestone.
5535-5543	Samples missing.
5543-5554	Limestone, cream to tan, dense with calcite veinlets and vari-colored shale fragments.
5554-5562	Limestone, brown to cream, dense with argillaceous partings.
5562-5594	Same with brown fine crystalline dolomite.
5594-5601	Same with dolomitic siltstone.
5601-5631	Same with little black shale and calcite veinlets.
5631-5697	Same with brown, fine crystalline, dolomite
5697	Total depth. Well stopped in rocks of St. Peter-Everton age.