

(200)

R290

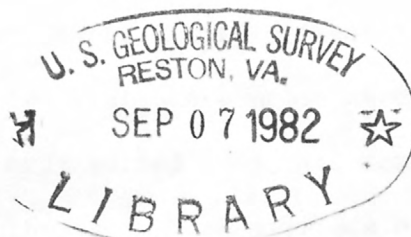
no. 82-787



STRATIGRAPHIC FRAMEWORK AND DISTRIBUTION OF LIGNITE IN THE
CLAIBORNE GROUP, CALHOUN COUNTY, ARKANSAS

by

Bettie S. Hackman



U.S. Geological Survey

Open-File Report 82-787

Open-file report
Geological Survey
(U.S.)

This report is preliminary and has not been reviewed
for conformity with U.S. Geological Survey editorial standards

336867

Stratigraphic Framework and Distribution of Lignite in the
Claiborne Group, Calhoun County, Arkansas

by

Bettie S. Hackman

Calhoun County, south-central Arkansas, is between the converging Ouachita River and Moro Creek (fig. 1), on the west edge of the Mississippi embayment. The northeastern part of the county is an upland that has been sculpted from the outcropping Claiborne Group of middle Eocene age. Altitudes there range from 250 to 300 feet above sea level. The upland terrain slopes generally south-westward to about 200 feet above sea level where it meets a gently undulate surface developed on Pleistocene stream-terrace deposits, which cover most of the bedrock in Calhoun County. Thicknesses of these terrace deposits range from a few feet to nearly 100 feet and average about 35 feet. Terrace sediments consist of gravel, poorly sorted sand, and some clay. The gently undulate plain continues sloping southward from an altitude of 200 feet to about 100 feet, where it merges with the broad alluvium-filled valley of the Ouachita River and the narrower flood plain of Moro Creek.

Deep oil and gas test wells have penetrated the entire Tertiary section in Calhoun County. These sediments are approximately 1,700 feet thick in the western part of the county and increase to about 2,500 feet in the eastern part. They dip eastward at about 20 feet per mile and strike northeast-southwest (Spooner, 1935, p. 278).

The Midway and Wilcox Groups of early Tertiary age have a combined thickness ranging from 1,050 to 1,350 feet. The Claiborne Group of middle Eocene age varies in thickness from 700 to 1,200 feet, with greater thickness in the eastern part of the county (Spooner, 1935, p. 278).

In Calhoun County the Cockfield Formation, the uppermost unit of the Claiborne Group, is the only Tertiary unit that is exposed at the surface. It maintains an average thickness of about 250 feet in Calhoun County, and it is probably the only unit that was penetrated in most of the drill holes in this study. The Cockfield is composed of back-beach and shallow water deposits formed during a time of rapid shoreline fluctuations. It consists of gray and brown fine sand and silt, and gray, brown, and green silty clay. Some of the almost silt-free sand lenses may represent beach deposits. Apparently, much of the formation was deposited under subaerial conditions as indicated by the abundance of lignitic sediments. The small amounts of glauconite found in some of the sediments may have been concentrated along the beaches by wave action (Albin, 1961, p. 44-45). The thick lignite beds in the Cockfield appear to be pod-shaped, elongate masses, which are not restricted to specific stratigraphic units but which are probably dependent upon a cyclic depositional history (Holbrook, 1980, p. 2).

Logs and lithologic descriptions from 84 drill holes of the Arkansas Geological Commission and from five ground-water observation wells of the U.S. Geological Survey were entered in the National Coal Resources Data System (NCRDS). These holes were drilled as part of the Arkansas Geological Commission program to delineate those areas most likely to contain beds of lignite 2.5 feet or more thick and under less than 150 feet of overburden. Nineteen of 84 drill holes penetrated at least one such lignite bed (fig. 1). Depth of the drill holes ranged from 90 to 300 feet; most were 200 feet deep.

Computer-generated log plots were used to construct the eight stratigraphic sections. These sections show the wide variations in lithology of the Claiborne sediments and demonstrate the lenticular nature of the lignite. Most individual

lignite beds can be traced only a short distance (less than a mile) with any degree of certainty.

Two exceptional lignite beds are illustrated by sections F-F' and H-H'. Section F-F' illustrates a single lignite bed having thicknesses ranging from 4 to 10 feet apparently connected over about 4 miles along the northeast-southwest strike of the Claiborne sediments. Section H-H' shows a 7-foot thick lignite bed in drill hole 907 GW (DH 907 GW) that can be traced approximately 6 miles downdip to the southeast and that may connect with a 5-foot thick lignite bed in drill hole 441 (DH 441). Most of the drill holes containing significantly thick and extensive beds of lignite are in the vicinity of Hampton. A study of the logs of these drill holes indicates that two separate pods of lignite probably locally are mineable. Map A outlines these areas; area A is approximately 7.5 miles long, and area B is nearly 5 miles long.

Areas A and B are among several prospects in south-central Arkansas where major energy companies have spent millions of dollars for exploration since 1973 and have leased about 200,000 acres containing proven reserves of over 2 billion tons of lignite (Holbrook, 1980). With resources of this magnitude, it is apparent that the published data for this report give an incomplete resource evaluation of the lignite in Calhoun County. Additional data exist in the form of logs of exploration drill holes; however, the logs are held proprietary by the exploring companies and are not available for public resource estimations.

REFERENCES

- Albin, D. R., 1961, Geologic section of Bradley, Calhoun, and Ouachita, and part of Nevada Counties, Arkansas: Arkansas Academy of Science Proceedings, v. 15, p. 38-54.
- Holbrook, D. F., 1980, Arkansas lignite investigations -- Preliminary report: Arkansas Geological Commission, 157 p.
- Spooner, W. C., 1935, Oil and gas geology of the Gulf Coastal Plain in Arkansas: Arkansas Geological Survey Bulletin 2, 516 p.

INDEX MAP

CALHOUN COUNTY

HAMPTON

OUACHITA

RIVER

MORO CREEK

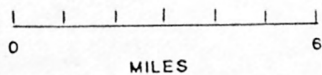


Figure 1. - Drill holes penetrating one or more beds of lignite 30 inches or more thick.

USGS LIBRARY-BOSTON



3 1818 00071924 3