Shallow Coal Exploration Drill-Hole Data, Western Tennessee

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Chapter I of

Shallow Coal Exploration Drill-Hole Data—Alabama, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, South Carolina, Tennessee, and Texas

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Contents

Figures

Tables

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Introduction

Coal exploration drill-hole data from 2,390 wells covering 18 counties in western Tennessee drilled between 1970 and 1977 by Phillips Coal Company, a division of Phillips Petroleum Company (Phillips), are discussed in this chapter, and the data are provided in an accompanying spreadsheet. The data are part of a nationwide dataset donated to the U.S. Geological Survey (USGS) by the North American Coal Corporation in 2001 (see chapter A, this volume). The data were digitized from field maps to create unified and spatially consistent coal exploration drill-hole datasets for each of the States in the donation (chapters B–K, this volume). Data for western Tennessee include a geologic map of the State with drill-hole coverage (fig. I1), a list of data attributes and explanations of the data format (table I1), a list of comments found in the data and their explanations (table I2), a list of counties and the number of drill holes for each county (table I3), and tabulated data in spreadsheet format (see appendix I1).

Methods

Hardcopy Phillips exploration maps, in western Tennessee 1927 State coordinate plane projection, were scanned and digitized into a geographic information system (GIS) using ArcMap™ software from the Environmental Systems Research Institute, Inc. (ESRI). Roads and county boundaries served as reference points to georeference the scanned exploration maps. Coal data attributes (table I1) were populated using the information contained on the exploration maps. Comments have been added by USGS staff if there were problems or uncertainties during compiling or if any additional information on the maps needed to be described (table I2). The dataset was projected into a North American Datum of 1983 geographic coordinate system to facilitate combining the dataset with similar Phillips datasets published by the USGS for other States. The data attributes were exported from the GIS to a spreadsheet (see appendix I1).

Generalized Coal Geology of Western Tennessee

Western Tennessee (fig. I1) is part of the Mississippi Embayment structure (fig. I2), which is a syncline filled with several thousands of feet of Upper Cretaceous to Upper Eocene marine and deltaic sediments locally overlain by Pliocene and Quaternary fluvial deposits of the Mississippi River (Cox and Van Arsdale, 2002). Lignite beds and lignitic clays occur as discontinuous lenses in sediments of the Paleogene Wilcox Group, Claiborne Group, Jackson Formation, and less frequently in the Upper Cretaceous McNairy Formation (fig. I3) (Hackley and others, 2006; Parks, 1981). These lignite deposits are part of the Gulf Coastal Plain Coal Province (Hackley and others, 2006).

Data

The western Tennessee drill-hole dataset contains coal exploration information for 2,390 drill-hole locations within 18 counties in the Gulf Coast region. Geophysical instruments were used on a total of 419 drill holes with probe depths ranging from 63 to 300 feet, while the remaining 1,971 drill holes were assigned a probed depth value of 0 feet due to unrecorded probe depths on the original maps. The densest drill-hole coverage is found in the center of western Tennessee in Lauderdale, Dyer, Crockett, and Gibson Counties, which include 40 percent of the total data (table I3). Due to the generalized nature of the original highway maps that contained the drill-hole information and the process of georeferencing these maps to a new base layer, we expect the location error to be ±0.25 mile.

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Appendix I1

The western Tennessee coal exploration drill-hole dataset in spreadsheet format is available at *pubs.usgs.gov/of/2011/1261/Appendices/I1-TN.xls*.

Table I1. Attribute titles and data descriptions and formats for the western Tennessee drill-hole dataset.

Attribute title	Data description and format
DRILL-HOLE NAME	Two-letter county code followed by drill-hole number.
COUNTY	The county where the drill hole was located.
ELEVATION	Elevation above sea level in feet.
DEPTH_TOTAL	Depth of drill hole in feet.
DEPTH_PROBED	Depth of geophysical probe measurement in feet.
LATITUDE	Decimal degree location values given to 4 decimal places.
LONGITUDE	Decimal degree location values given to 4 decimal places.
COMMENT	Additional information regarding the entire drill hole.
X_C	Thickness of coal for bed number X in decimal feet.
X_CP	Thickness of coal and partings combined for bed number X in decimal feet.
X_DEPTH	Top depth of bed number X in feet.
X_BED	A number or letter assigned to different coal beds of the same drill hole, which is not correlated throughout the dataset.
X_COMMENT	Additional information regarding coal bed X.

Table I2. Explanation of comments used to describe the western Tennessee drill-hole dataset (J.A. Luppens, U.S. Geological Survey, written communication, 2009).

Comment	Explanation
BED DEPTH NOT RECORDED	No coal-bed depth information was recorded for this coal bed.
I	Abbreviation for inferior. Subjective term used to describe poor coal quality.
NC	Abbreviation for "no coal." No coal was found during exploration for this drill hole.
NC/CLAY	No coal was found during exploration, but a kaolinitic clay deposit was found during drilling.
NO DATA RECORDED	No data were recorded on original coal exploration maps for this drill hole.
NO ELEVATION RECORDED	No ground elevation information was recorded on the original coal exploration maps for this drill hole.
NP	Abbreviation for "not probed." Geophysical logging never occurred at this location.
NSL	Abbreviation for "no significant lignite." Coal may have been found during exploration but because the coal beds were thin (usually less than 2 feet thick) no coal data were recorded.
PI	Abbreviation for "partially inferior." Used to describe that a portion of the coal bed is of a low quality.

Table I3. Western Tennessee counties and the number of drill holes by county.

County	Number of drill holes
Benton	1
Chester	9
Crocket	124
Carroll	3
Dyer	208
Fayette	122
Gibson	144
Hardeman	204
Haywood	181
Henry	100
Lauderdale	501
Lake	39
Madison	42
Mississippi	2
Obion	267
Shelby	54
Tipton	170
Weakley	219
Total	2,390

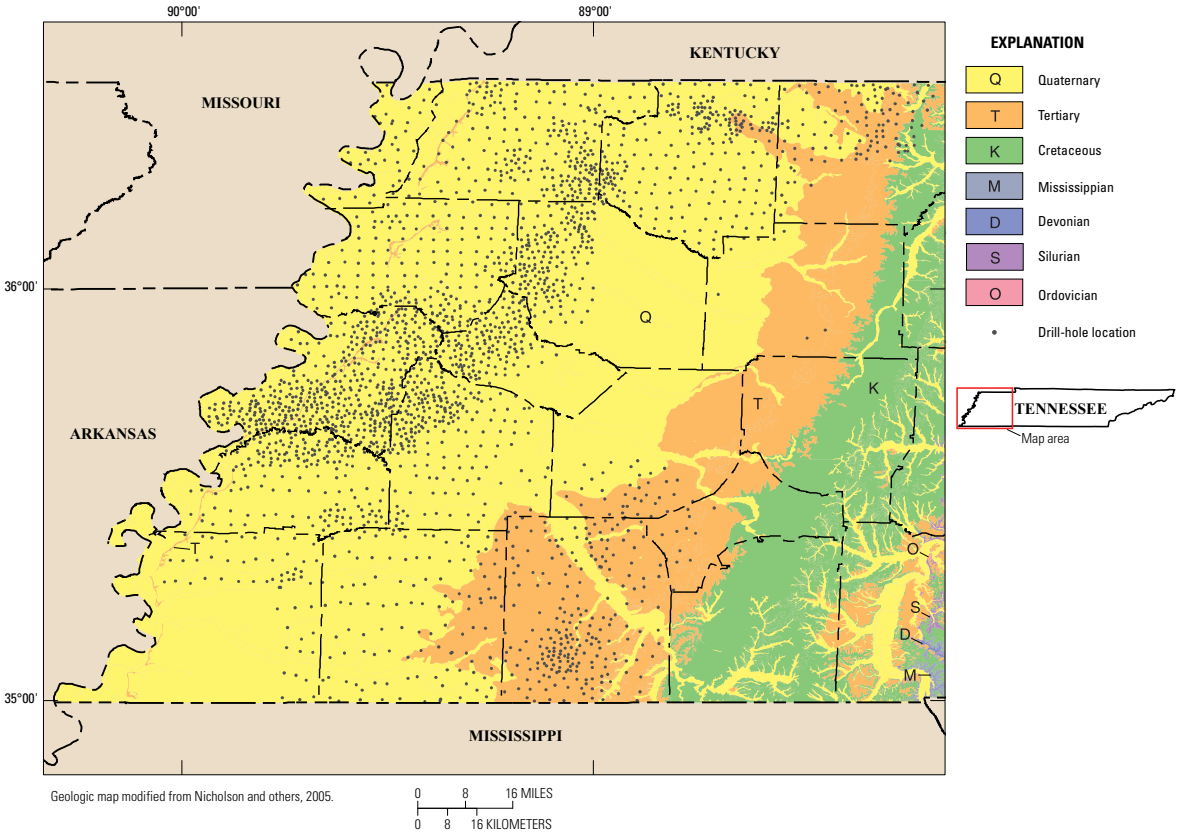

Figure I1. Regional geologic map of western Tennessee with county boundaries overlaid with drill-hole locations from the western Tennessee coal exploration drill-hole dataset (geologic map modified from Nicholson and others, 2005).

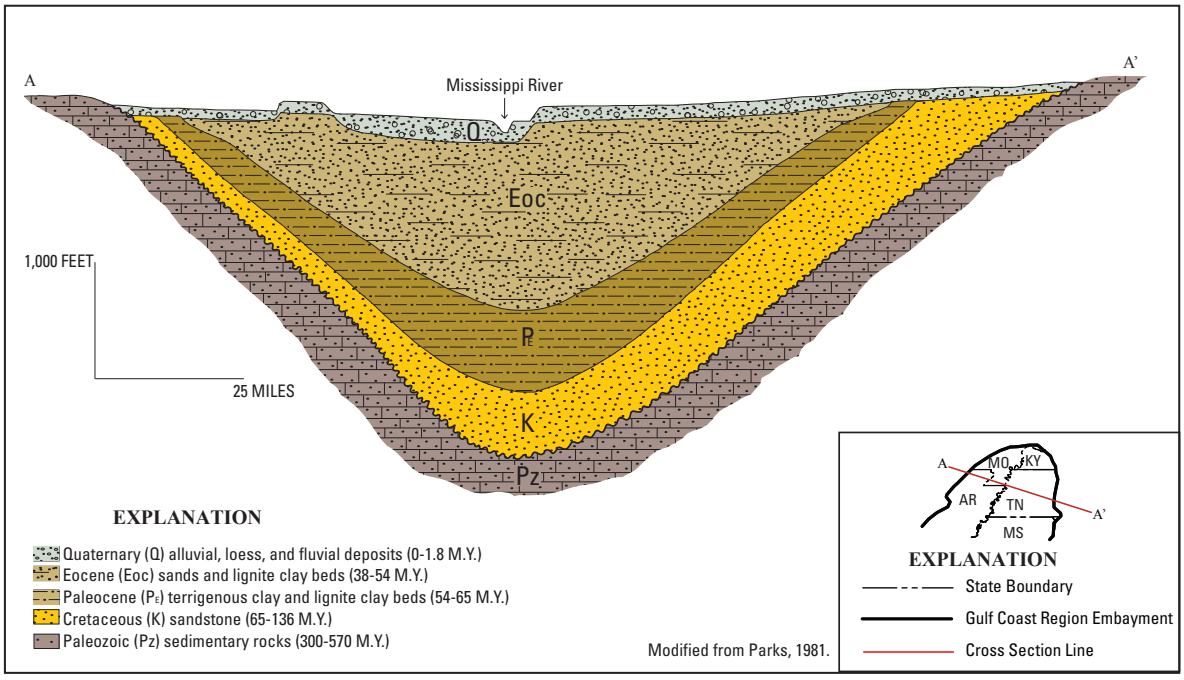

Figure I2. Cross section of the Mississippi Embayment (modified from Parks, 1981).

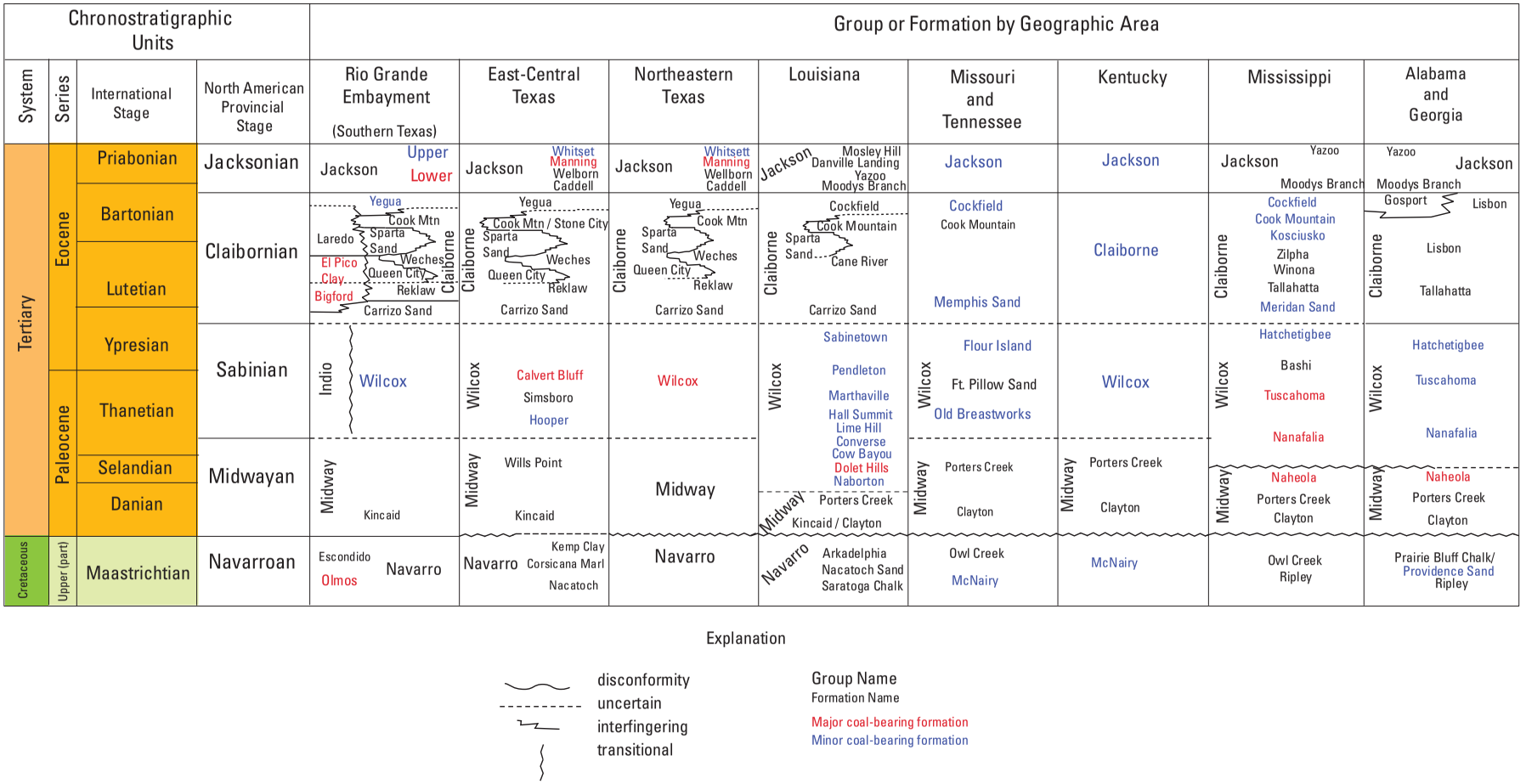

Figure I3. Generalized stratigraphic chart showing major and minor coal-bearing formations in the Mississippi Embayment and Gulf Coastal Plain (modified from Warwick and others, 1997; Ogg and others, 2008).