Text to Accompany:

Open-File Report 79-1391

1979

# COAL RESOURCE OCCURRENCE MAPS AND COAL DEVELOPMENT POTENTIAL OF THE PINE KNOLL QUADRANGLE, UINTA COUNTY, WYOMING

Prepared for

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

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# INTRODUCTION

## Purpose

This report was compiled to support the land planning work of the Bureau of Land Management (BLM) to provide a systematic coal resource inventory of Federal coal lands in Known Recoverable Coal Resource Areas (KRCRA's) in the western United States. This investigation was undertaken by Dames & Moore, Denver, Colorado, at the request of the U.S. Geological Survey under contract number 14-08-0001-17104. The resource information gathered for this report is in response to the Federal Coal Leasing Amendments Act of 1976 (P.L. 94-377). Published and unpublished public information available through May, 1978, was used as the data base for this study. No new drilling or field mapping was performed, nor was any confidential data used.

## Location

The Pine Knoll quadrangle is located in southwestern Uinta County, Wyoming, approximately 11 airline miles (18 km) southeast of the town of Evanston and 24 airline miles (39 km) southwest of the town of Fort Bridger. Numerous houses and buildings are present along Wyoming Highway 150 across Hilliard Flat.

## Accessibility

Wyoming Highway 150, a paved medium-duty road connecting the town of Evanston, Wyoming, to the northwest of the quadrangle with Park City, Utah, to the southwest, crosses north-south through Hilliard Flat in the northwestern part of the quadrangle and across the southwestern corner of the quadrangle. Interstate Highway 80, passing through Evanston, crosses east-west through southern Wyoming connecting the city of Ogden, Utah, to the west with the city of Rock Springs, Wyoming, to the east. An improved light-duty road crosses north-south on the eastern side of Hilliard Flat with a branch to the east and northeast to serve the Sulphur Creek oil field. Several unimproved dirt roads and trails provide access through the remainder of the quadrangle (U.S. Bureau of Land Management, 1971; Wyoming State Highway Commission, 1978).

The main east-west line of the Union Pacific Railroad lies approximately 3.5 miles (5.6 km) north of the quadrangle. It proives railway service across southern Wyoming connecting Ogden, Utah, to the west with Omaha, Nebraska, to the east (U.S. Bureau of Land Management, 1978).

## Physiography

The Pine Knoll quadrangle lies on the western edge of the Green River Basin and on the southeastern edge of the Wyoming Overthrust Belt. The landscape within the quadrangle is characterized by the large, flat-lying valley of Hilliard Flat in the western third of the quadrangle and by rolling, hilly topography in the eastern two thirds of the quadrangle. Altitudes in the quadrangle range from approximately 7,240 feet (2,207 m) on Sulphur Creek on the north-central edge of the quadrangle to 9,400 feet (2,865 m) in the southeastern corner of the quadrangle. Pine Knoll in the east-central part of the quadrangle rises to an elevation of over 8,420 feet (2,566 m) above sea level.

Sulphur Creek and a tributary, La Chapelle Creek, flow northerly through the central and eastern parts of the quadrangle, respectively. Mill Creek flows northwesterly across the southwestern corner of the quadrangle. All are tributaries of the Bear River to the northwest of the quadrangle boundary. Numerous small lakes, reservoirs, and canals are located within the quadrangle.

## Climate and Vegetation

The climate of southwestern Wyoming is semiarid, characterized by low precipitation, rapid evaporation, and large daily temperature variations. Summers are usually dry and mild, and winters are cold. The annual precipitation averages approximately 10 inches (25 cm) and is fairly evenly distributed throughout the year (Wyoming Natural Resources Board, 1966).

The average annual temperature of the area is 39° F (4° C). The temperature during January averages 17° F (-8° C) and typically ranges

from 4° F (-16° C) to 30° F (-1° C). During July, the average temperature is 62° F (17° C), and the temperature typically ranges from 43° F (6° C) to 82° F (28° C) (Wyoming Natural Resources Board, 1966; U.S. Bureau of Land Management, 1978).

Winds are usually from the west and west-southwest with an average annual velocity of approximately 15 miles per hour (24 km per hr) (U.S. Bureau of Land Management, 1978).

Principal types of vegetation in the quadrangle include grasses, sagebrush, and rabbitbrush. Most of the Hilliard Flat area in the western third of the quadrangle is utilized as cropland (U.S. Bureau of Land Management, 1978).

### Land Status

The Pine Knoll quadrangle lies on the southern edge of the Kemmerer Known Recoverable Coal Resources Area (KRCRA). Only a small area in the northern part of the quadrangle, approximately 10 percent of the quadrangle's total area, lies within the KRCRA boundary. The Federal government owns the coal rights for about one quarter of this area as shown in figure 2. (All figures are located at the end of this report.) No outstanding Federal coal leases, prospecting permits, or licenses occur within the quadrangle.

## GENERAL GEOLOGY

### Previous Work

Veatch (1907) mapped the geology and economic resources of a large part of Uinta and Lincoln counties in southwestern Wyoming, including the the northern half of the Pine Knoll quadrangle. Cobban and Reeside described the stratigraphy of the coal-bearing Frontier Formation in the Kemmerer area in 1952. Hale (1960) described the stratigraphy of the Frontier Formation in southwestern Wyoming and Utah. Glass reported chemical analyses and measured sections of the coal beds in the Adaville Formation in the Kemmerer coal field in 1975, and updated information on the coal field in 1977. Cook (1976) described the structural geology of

the Aspen Tunnel area north of the Pine Knoll quadrangle. Roehler and others (1977) described the geology and coal resources of the Hams Fork coal region. Schroeder (1977) mapped the surface geology of the adjacent Sulphur Creek Reservoir quadrangle to the north.

## Stratigraphy

The formations cropping out in the Pine Knoll quadrangle range in age from Late Cretaceous to Eocene and include the Frontier, Adaville and Wasatch.

The Frontier Formation of early Late Cretaceous age crops out in the north-central part of the quadrangle where it conformably overlies the Aspen Shale. The formation consists primarily of sandstone, siltstone, mudstone, carbonaceous shale, and, possibly, coal (Cobban and Reeside, 1952). The upper part of the formation contains a ridge-forming white to light-gray-weathering sandstone 85 to 100 feet (26 to 30 m) thick (Schroeder, oral communication, 1979). This unit, the Oyster Ridge Sandstone Member, is charactertized by the presence of Ostrea soleniscus, a long, slender oyster (Buzzoto, 1977). The formation may be as much as 2,800 feet (853 m) thick in the Pine Knoll area (Cook, 1977).

Part of the Adaville Formation is exposed near the northern border of the quadrangle in sec. 9, T. 13 N., R. 119 W. (Veatch, 1907). Detailed stratigraphic descriptions of the Adaville Formation in the Pine Knoll quadrangle are not available. However, the Adaville Formation generally consists of carbonaceous claystone, siltstone, sandstone, and coal (Cobban and Reeside, 1952). A regressive sand sequence, the Lazeart Sandstone Member, comprises the lower 200 to 400 feet (61 to 122 m) of the formation, conformably overlying the Hilliard Shale (Rubey and others, 1975).

An unknown thickness of variegated mudstone, sandstone, and siltstone of the Wasatch Formation unconformably overlies Cretaceous and older rocks in the eastern part of the quadrangle (Cook, 1977). These strata were originally assigned to the Knight Formation (Veatch, 1907).

Holocene deposits of alluvium cover the stream valleys of the creeks in the Pine Knoll quadrangle, and Quaternary terrace gravels cover much of the western part of the quadrangle.

The Upper Cretaceous formations in the Pine Knoll quadrangle indicate the transgressons and regressions of a broad, shallow north-south seaway that extended across central North America. These formations accumulated near the western edge of the Cretaceous sea and reflect the location of the shoreline (Weimer, 1960 and 1961).

The Frontier Formation sediments were deposited during two major transgressions and regressions of the sea. The coal beds in the upper and lower parts of the formation were deposited in coastal swamps during periods when the sea retreated eastward. The Oyster Ridge Sandstone Member is a littoral or beach deposit marking the retreat of the Cretaceous sea from the area (Hale, 1960; Myers, 1977; Roehler and others, 1977).

The marine sequence of shales and sandstones of the Hilliard Shale were deposited during a transgression of the Cretaceous sea and indicate the fluctuations of the shoreline (Roehler and others, 1977).

The Adaville Formation reflects deposition in flood plains and swamps along a coastal plain. The Lazeart Sandstone Member at the base of the formation is a beach deposit marking a transition from the marine deposition of the Hilliard Shale to the continental coastal plain deposition of the Adaville Formation (Roehler and others, 1977).

The Wasatch Formation is composed of continental sediments. The bright-colored mudstones were probably deposited on a flood plain which was later cut by stream channels (Oriel and Tracey, 1970).

## Structure

The Pine Knoll quadrangle is located on the southeastern edge of the structurally complex Wyoming Overthrust Belt. Folded Paleozoic and Mesozoic rocks are thrust eastward over folded older-Cretaceous rocks

with younger Cretaceous and Tertiary rocks resting unconformably on top of the older rocks. The Frontier Formation crops out on the eastern limb of the Lazeart Syncline, an asymmetrical fold lying beneath Hilliard Flats (Roehler and others, 1977).

Two major thrust faults have been mapped in the Pine Knoll quadrangle (Veatch, 1907). The Absaroka and Oil Spring faults trend north-south along the western edge of the quadrangle (figure 1). The Absaroka fault has been traced for over 200 miles (322 km) along strike (Cook, 1977) with the southernmost exposures in the Pine Knoll area.

## COAL GEOLOGY

Both the Adaville and Frontier Formations are known to be coal-bearing where they can be traced north of the Pine Knoll quadrangle. Drilling conducted in this quadrangle during the Union Pacific coal inventory of 1969 and 1970 (Rocky Mountain Energy Company, no date) did not reveal any coal beds. Several coal test holes were drilled in the area between the Absaroka and Oil Spring faults where the Frontier Formation exists in the subsurface. In addition, four holes were drilled in sec. 11, T. 13 N., R. 119 W., where the Frontier Formation is exposed. Subsurface information regarding the Adaville Formation is not known to be available.

## COAL DEVELOPMENT POTENTIAL

Areas where coal beds of Reserve Base thickness (5 feet or 1.5 meters) or greater are overlain by 3,000 feet (914 m) or less of overburden are considered to have development potential for surface and subsurface mining methods. In the Pine Knoll quadrangle, coal beds of Reserve Base thickness are not known to be present. Therefore, all Federal lands within the KRCRA boundary in this quadrangle have been classified as having unknown development potential for surface and subsurface mining methods.

The source of each indexed data point shown in figure 1 is listed in table 1.

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Table 1. -- Sources of data used in figure 1

| Plate 1 Index Number | Source | Data Base |
|---|---|---|
| 1 | Rocky Mountain Energy Co., (no date), unpublished data | Drill hole No. 4 Line A |
| 2 | ↓ | Drill hole No. 3 Line A |
| 3 | ↓ | Drill hole No. 2 Line A |
| 4 | ↓ | Drill hole No. 1 Line A |
| 5 | Allen Lynn | Oil/gas well No. 1 S.C. Patterson |
| 6 | Eastern Idaho Development Co. | Oil/gas well No. 1 Esther |
| 7 | Jeffery and Darley | Oil/gas well No. 1 Bate |
| 8 | New Park Mining Co. | Oil/gas well No. 2 Pierce |
| 9 | Rocky Mountain Energy Co., (no date), unpublished data | Drill hole No. 2 Line A |
| 10 | ↓ | Drill hole No. 2 Line A |
| 11 | ↓ | Drill hole No. 1 Line A |
| 12 | ↓ | Drill hole No. 1 Line A |

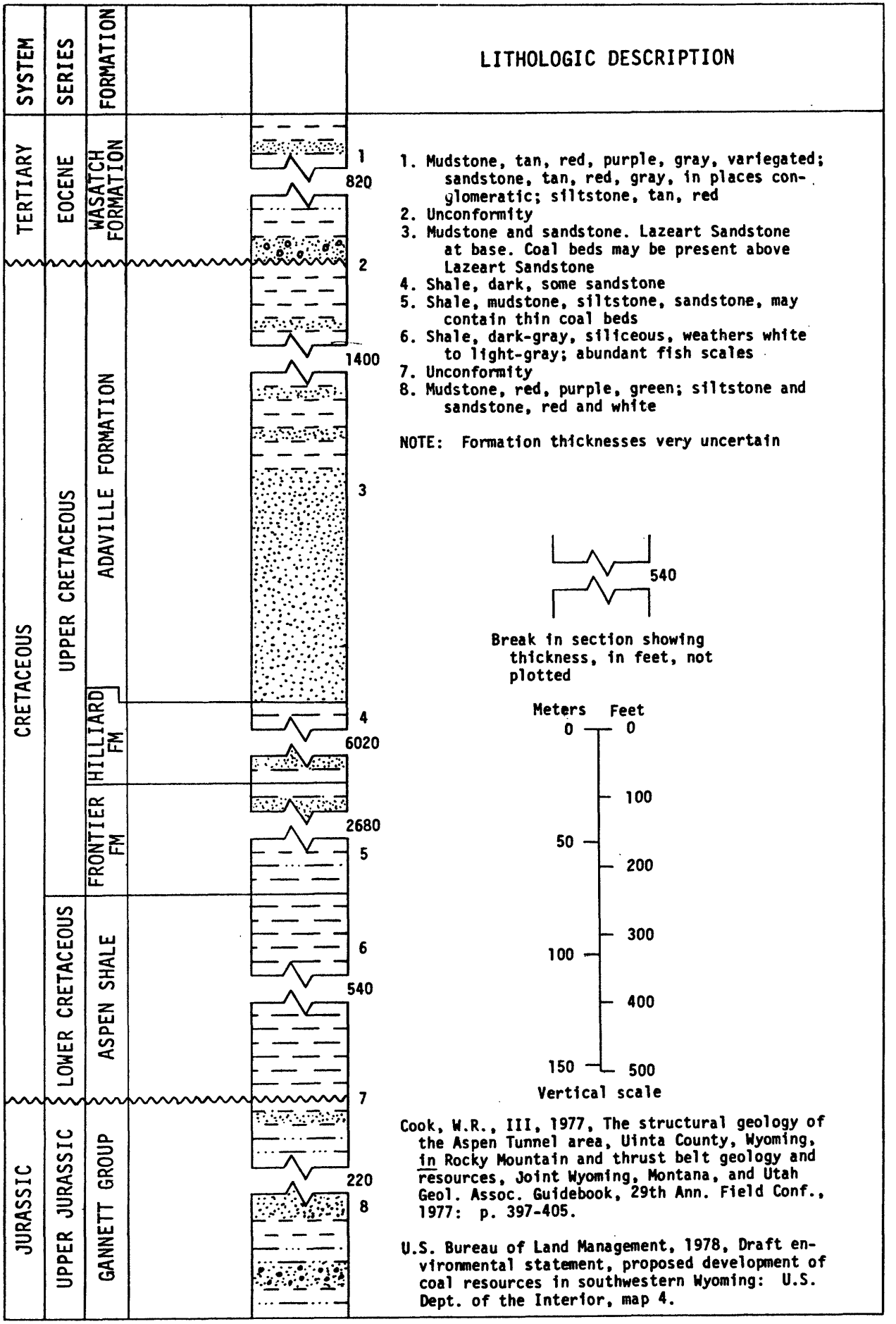


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FIGURE 3. — Composite columnar section.

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