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COAL RESOURCE OCCURRENCE MAP AND COAL DEVELOPMENT POTENTIAL OF THE CLAY BUTTES SE QUADRANGLE, SWEETWATER COUNTY, WYOMING

[Report includes 1 plate]

Prepared for

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

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CONTENTS

	Page
Introduction	1
Purpose	1
Location	1
Accessibility	1
Physiography	2
Climate and vegetation	2
Land status	3
General geology	3
Previous work	3
Stratigraphy	3
Structure	7
Coal geology	7
Coal development potential	8
References	9

ILLUSTRATIONS

Plate 1. Boundary and coal data map

Page

Figure 1. Composite columnar section of the Clay Buttes SE quadrangle..... 4

INTRODUCTION

Purpose

This text is to be used in conjunction with the Coal Resource Occurrence Map of the Clay Buttes SE quadrangle, Sweetwater County, Wyoming. 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 Published and unpublished public information available through June, 1978, was used as the data base for this study.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 Clay Buttes SE quadrangle is located in west-central Sweetwater County, Wyoming, approximately 11 miles (18 km) northwest of the city of Rock Springs, Wyoming, via U.S. Highway 187. The quadrangle is unpopulated.

Accessibility

U.S. Highway 187 crosses north-south through the western third of the quadrangle, connecting the town of Eden, Wyoming, to the northwest with the city of Rock Springs to the southeast. An improved light-duty road, Chiltons Cutoff, crosses the southeastern corner of the quadrangle. Interstate Highway 80, crossing east-west through southern Wyoming, passes through Rock Springs approximately 12 airline miles (19 km) southeast of the quadrangle. Numerous secondary dirt roads and trails provide access through the remainder of the quadrangle.

The main east-west line of the Union Pacific Railroad passes through Rock Springs and provides railway service across southern Wyoming, connecting Ogden, Utah to the west with Omaha, Nebraska to the east. A spur from the main line extends north from Rock Springs to near Atlantic

City, Wyoming, and passes through the southeastern part of the quadrangle. North of the Winton Cutoff this spur is privately owned by the U.S. Steel Corporation.

Physiography

The Clay Buttes SE quadrangle is located on the northwestern flank of the Rock Springs uplift. The landscape within the quadrangle is characterized by the long easterly-facing escarpment of White Mountain extending north-south through the eastern third of the quadrangle. The remainder of the quadrangle consists of broad, gently-dipping slopes. Altitudes in the quadrangle range from approximately 6,440 feet (1,963 m) on Killpecker Creek in the southeastern corner of the quadrangle to 7,590 feet (2,313 m) at the crest of the escarpment on the northern edge of the quadrangle.

The eastern third of the quadrangle is drained by Killpecker Creek, a tributary of Bitter Creek south of the quadrangle. The western two thirds of the quadrangle is drained by Alkali Creek, a tributary that drains into the Green River west of the quadrangle. All intermittent streams in the quadrangle flow mainly in response to snowmelt in the spring.

Climate and Vegetation

The climate of southwestern Wyoming is semiarid and is characterized by low precipitation, rapid evaporation, and large daily temperature changes. Summers are usually dry and mild, and winters are cold. The annual precipitation averages 9 inches (23 cm), with approximately two thirds falling during the spring and early summer months.

The average annual temperature is 42°F (6°C). The temperature during January averages 18°F (-8°C), with temperatures ranging from 8°F (-13°C) to 28°F (-2°C). During July temperatures range from 54°F (12°C) to 84°F (29°C), with an average of 69°F (21°C) (U.S. Bureau of Land Management, 1978, and Wyoming Natural Resources Board, 1966).

Winds are usually from the west-southwest and southwest with an average velocity of 11 miles per hour (18 km per hr) (U.S. Bureau of Land Management, 1978).

Principal types of vegetation in the area include sagebrush, saltbush, greasewood, rabbitbrush, mountain mahogany, juniper, serviceberry, and grasses (U.S. Bureau of Land Management, 1978).

Land Status

The Clay Buttes SE quadrangle lies on the northwestern side of the Rock Springs Known Recoverable Coal Resource Area (KRCRA). Approximately 17 percent of the quadrangle lies within the KRCRA boundary. The Federal government owns the coal rights for approximately 40 percent of this area, as shown on plate 1. No outstanding Federal coal leasees, prospecting permits, or licenses occur within the quadrangle.

GENERAL GEOLOGY

Previous Work

Schultz (1909) described the geology and coal resources of the southern part of the Rock Springs coal field. Hale (1955), Smith (1961), and Keith (1965) described the stratigraphy and discussed the depositional environment of Upper Cretaceous formations in the Rock Springs area. Roehler (1961) described the Late Cretaceous-Tertiary unconformity present in the Rock Springs area. Tertiary-age stratigraphy along the western flanks of the Rock Springs uplift has been described by Bradley (1964), Culbertson (1965), Stuart (1965), and Roehler (1965). Roehler and others described the geology and coal resources of the Rock Springs coal field in 1977. A geologic map of the Rock Springs uplift was prepared by Roehler in 1977.

Stratigraphy

The Green River and Wasatch Formations are exposed in the area outlined by the KRCRA boundary in the southeastern part of the quadrangle. The Fort Union and Almond Formations are present in the subsurface and all the formations, excluding the Green River, are known to contain coal (figure 1).

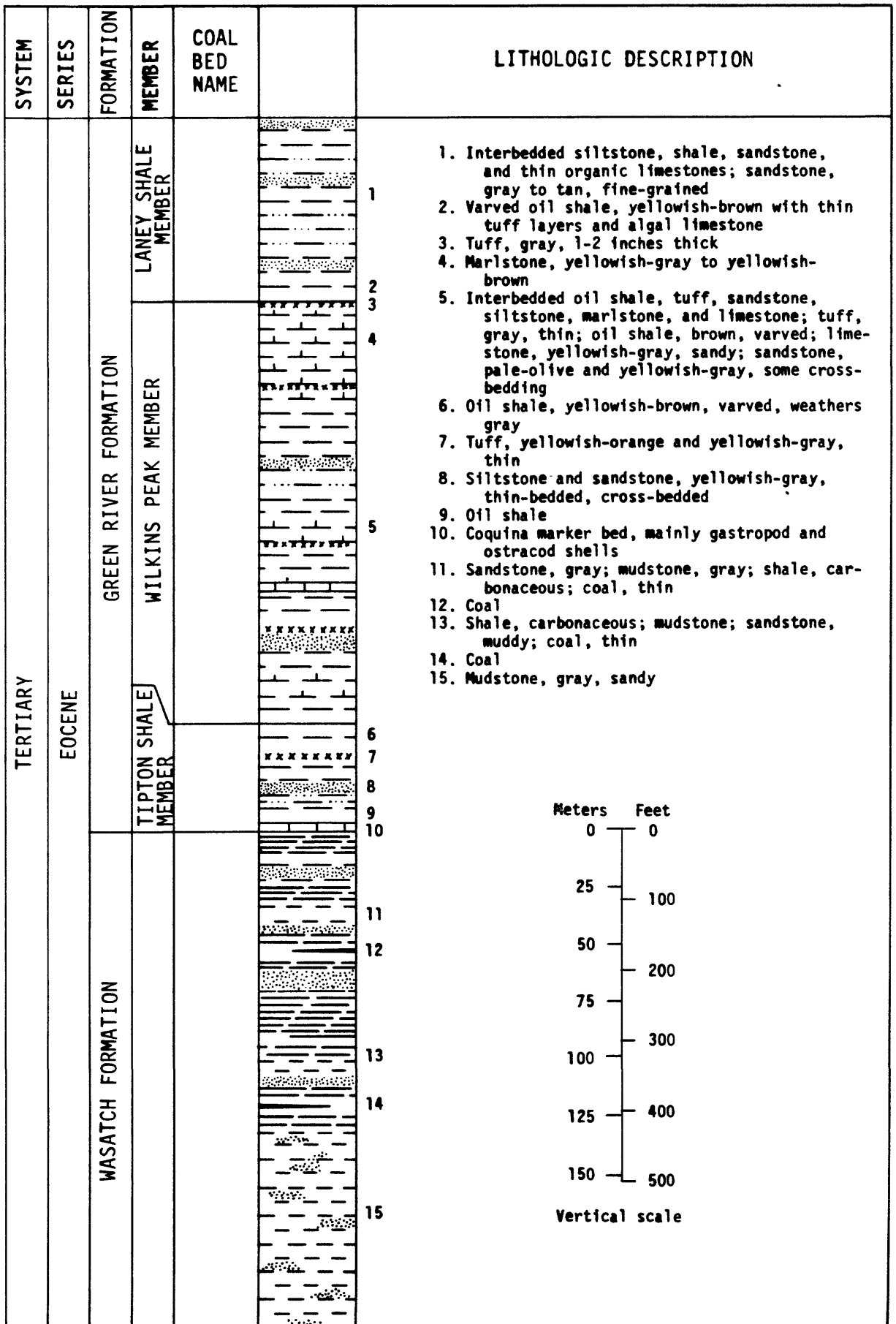
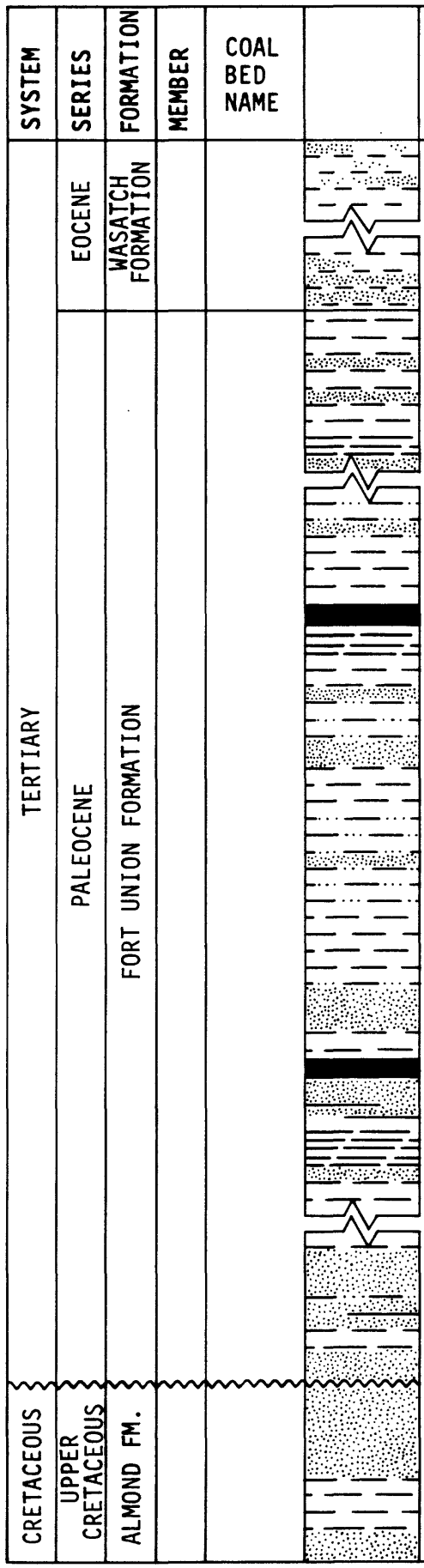


FIGURE 1. — Composite columnar section of the Clay Buttes SE quadrangle.



LITHOLOGIC DESCRIPTION

Thickness undetermined

16. Sandstone, gray, lenticular; siltstone, gray, lenticular; shale, gray; shale, gray; shale, brown or gray, carbonaceous
17. Coal
18. Sandstone, gray, lenticular; siltstone, gray, lenticular, shale gray; shale, brown or gray, carbonaceous
19. Coal
20. Sandstone, gray, lenticular; siltstone, gray, lenticular; shale, gray; shale, brown or gray, carbonaceous; coal
21. Unconformity
22. Sandstone, gray; shale, gray

Break in section showing thickness, in feet, not plotted

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FIGURE 1. — Continued.

The Almond Formation of Late Cretaceous age is present in the British-American Oil Producing Company #1 Gras well located in the adjacent Pilot Butte quadrangle to the south in sec. 33, T. 21 N., R. 101 W., at a depth of 5,304 feet (1,617 m). The formation consists of carbonaceous shale, siltstone, mudstone, and sandstone alternating with coal beds of variable thickness and quality. The upper part of the formation is predominantly buff-colored to light-gray, thick-bedded to massive fossiliferous sandstone. The facies present reflects deposition in fresh-water coastal swamps, brackish-water lagoons, and shallow-water marine environments (Hale, 1950 and 1955). The Almond Formation occurs at depths greater than 3,000 feet (914 m) in this quadrangle.

The Fort Union Formation of Paleocene age unconformably overlies the Almond Formation and is approximately 1,620 feet (494 m) thick where measured in the #1 Gras well. The formation is composed of gray lenticular sandstones and siltstones, gray shales, brown or gray carbonaceous shales, and thick coals, deposited mainly in paludal (swamp) environments (Roehler and others, 1977).

An unknown thickness of the Wasatch Formation of Eocene age is exposed along the eastern half of the quadrangle. The main body, overlying the Fort Union Formation, is composed of gray sandy mudstone, carbonaceous shale, muddy sandstone and thin coal. The coals were probably deposited in fresh-water swamps lying in topographic lows within an intermontane basin (Bradley, 1964, and Roehler and others, 1977).

The Tipton Shale, Wilkins Peak and Laney Shale Members of the Green River Formation of Eocene age form the White Mountain escarpment that trends north-south through the center of the quadrangle. The Tipton Shale Member varies in thickness from 80 to 165 feet (24 to 50 m) and consists of pale- to dark-yellowish-brown oil shales and yellowish-gray, thin-bedded, cross-bedded sandstones and siltstones. Throughout the area, a coquina marker bed composed of gastropods and ostracods is found near the base of the member. The Tipton Shale Member, or Tipton Tongue, was deposited in the lacustrine environment of Tipton Lake,

the largest of the Eocene-age fresh-water lakes in southwestern Wyoming (Roehler, 1965, and Stuart, 1965).

The Wilkins Peak Member overlies the Tipton Shale Member and consists of thin gray tuffs, brown varved oil shale, yellowish-gray, sandy limestone, and pale-olive and yellowish-gray sandstone. The Wilkins Peak Member is approximately 910 feet (277 m) thick in T. 18 N., R. 106 W., and thins progressively northward to T. 25 N., R. 102 W., where it is only a few feet thick. The member was deposited during the influx of Wilkins Peak Lake which covered parts of the Green River, Great Divide and Washakie Basins (Roehler, 1965, and Stuart, 1965).

The Laney Shale Member of the Green River Formation consists of an unknown thickness of interbedded siltstone, shale, sandstone, and thin organic limestones deposited in a shallow lacustrine environment. A basal unit, overlying the Wilkins Peak Member, is usually present and consists of low-grade varved oil shales that were deposited in a deep lacustrine environment (Roehler, 1965).

Recent deposits of alluvium cover the stream valleys of Killpecker Creek, Alkali Creek and their tributaries.

Structure

The Clay Buttes SE quadrangle is located on the western flank of the Rock Springs uplift which separates the Great Divide and Green River structural basins. The strike of the beds in this quadrangle is generally to the north with the beds dipping 6° to 12° to the west. No major faults have been mapped in the quadrangle (Bradley, 1964).

COAL GEOLOGY

No coal or oil and gas exploration holes have been drilled in the Clay Buttes SE quadrangle. However, oil and gas wells in the surrounding area have yielded enough information to predict the stratigraphy and general coal geology that may be encountered in the subsurface.

The British-American Oil Producing Company #1 Gras well just south of the quadrangle boundary encountered two thick Fort Union Formation coal beds at depths of approximately 4,100 and 4,600 feet (1,250 and 1,402 m). These coal beds apparently underlie much of the Clay Buttes SE quadrangle, but only in the southeastern part of the quadrangle are they possibly less than 3,000 feet (914 m) below ground level. Roehler (oral communication, 1978) states that these coal beds may thicken to between 50 and 60 feet (15 and 18 m) to the west in the Green River Basin. Updip to the east, the upper coal bed is known to thin from 20 feet (6 m) in the #1 Gras well to 4.5 feet (1.4 m) in outcrop in sec. 32, T. 21 N., R. 104 W. (Roehler and others, 1977). Outcrops of coal beds in the Fort Union Formation are present in both the southwest quarter of the Boars Tusk 15-minute quadrangle and in the Reliance quadrangle.

Two Wasatch Formation coal beds approximately 5 feet (1.5 m) thick were also indicated by the #1 Gras well. These coal beds are located at the top and bottom of a sandstone bed that is approximately 70 feet (21 m) thick at a depth of approximately 3,500 feet (1,067 m) below the ground surface. The lateral extent of these coal beds is unknown.

Although no chemical analyses are available, the Fort Union Formation coal of the Rock Springs uplift is generally ranked as subbituminous (Roehler, 1977), and the Wasatch Formation coal may rank as either lignite or subbituminous.

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) of overburden are considered to have development potential for either surface or subsurface mining methods. In the Clay Buttes SE quadrangle, coals of Reserve Base thickness are most likely present but the amount of overburden covering them is unknown. For this reason, Federal lands within the KRCRA boundary have been assigned an unknown development potential for surface and subsurface mining methods.

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