

Text to Accompany:

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COAL RESOURCE OCCURRENCE MAPS AND

COAL DEVELOPMENT POTENTIAL OF THE

PILOT BUTTE QUADRANGLE,

SWEETWATER COUNTY, WYOMING

[Report includes 3 plates]

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GEOLOGICAL SURVEY

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This report has not been edited
for conformity with U.S. Geological
Survey editorial standards or
stratigraphic nomenclature.

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INTRODUCTION

Purpose

This text is to be used in conjunction with Coal Resource Occurrence (CRO) Maps of the Pilot Butte 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 Published and unpublished public information available through May, 1978, was used as the data base for this study.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 Pilot Butte quadrangle is located in west-central Sweetwater County, Wyoming, approximately 3 miles (4.8 km) northwest of the city of Rock Springs and 9 miles (14.5 km) northeast of the town of Green River, Wyoming. With the exception of Fourteenmile Ranch on the north-central edge of the quadrangle, the quadrangle is unpopulated.

Accessibility

The U.S. Geological Survey topographic map of the Pilot Butte quadrangle (1961) indicates that U.S. Highway 187, a paved medium-duty road, crosses northwesterly through the northeastern corner of the quadrangle connecting the town of Eden, Wyoming to the northwest with Rock Springs to the southeast. Interstate Highway 80 passes east-west through Rock Springs approximately 3 miles (4.8 km) southeast of the quadrangle. Chilton's Cutoff and Winton Cutoff, both improved light-duty roads, branch to the northeast and east from U.S. Highway 187 in the northeastern corner of the quadrangle. White Mountain Road, an improved light-duty road, passes north-south through the central part of the quadrangle. Several unimproved 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 southeast of the quadrangle boundary. This line provides railway service across southern Wyoming, connecting Ogden, Utah to the west with Omaha, Nebraska to the east. A spur line extends north from Rock Springs to near Atlantic City, Wyoming, passing through the adjacent Reliance quadrangle to the east. The line is privately owned by the U.S. Steel Corporation north of the Winton Cutoff.

Physiography

The Pilot Butte quadrangle lies on the western 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 half of the quadrangle. The remainder of the quadrangle consists of broad, gently-dipping slopes, which in the western half of the quadrangle are cut by westerly-trending ravines and canyons. Pilot Butte rises approximately 420 feet (128 m) above the surrounding landscape in the southwestern part of the quadrangle. Altitudes in the quadrangle range from approximately 7,920 feet (2,414 m) on Pilot Butte to approximately 6,320 feet (1,926 m) in the southeastern corner of the quadrangle.

Fourteenmile Creek, lying along the northern edge of the quadrangle, and a number of other unnamed tributaries of Killpecker Creek to the east of the quadrangle, drain the eastern half of the quadrangle. Scotts Canyon is the major drainage in the western half of the quadrangle and is a tributary of Alkali Creek and the Green River that lie to the west of the quadrangle boundary.

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 Pilot Butte quadrangle lies on the western edge of the Rock Springs Known Recoverable Coal Resource Area (KRCRA). The eastern part of the quadrangle, approximately 50 percent of the quadrangle's total area, lies within the KRCRA boundary. The Federal government owns the coal rights for less than one half of this area, as shown on plate 2. No outstanding Federal coal leases, prospecting permits, or licenses occur within the quadrangle.

GENERAL GEOLOGY

Previous Work

Schultz (1910) described the geology and coal resources of the southern part of the Rock Springs coal field and (1920) the Baxter Basin and surrounding area. Hale (1950, 1955), Smith (1961), and Keith (1965) described the stratigraphy and depositional environment of Upper Cretaceous formations in the Rock Springs area. Roehler (1961) described the Late Cretaceous-Tertiary unconformity present in the area. Tertiary-age stratigraphy along the western flanks of the Rock Springs uplift has been discussed 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. In 1977, Roehler prepared a geologic map of the Rock Springs uplift.

Stratigraphy

The Tertiary-age Green River and Wasatch Formations crop out within the area outlined by the KRCRA boundary in the eastern half of the quadrangle. The Almond Formation of Late Cretaceous age and the Fort Union Formation of Paleocene age occur in the subsurface.

The Almond Formation, part of the Mesaverde Group of Late Cretaceous age, is present in the British-American Oil Producing Company #1 Gras well located in sec. 33, T. 21 N., R. 101 W., at a depth of approximately 5,300 feet (1,615 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 reflect deposition in fresh-water coastal swamp, brackish-water lagoon, and shallow-water marine environments (Hale, 1950 and 1955).

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. It thickens considerably down-dip to the west. 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 crops out along the eastern half of the quadrangle (Roehler, 1977). The main body, overlying the Fort Union Formation, is composed of gray sandy mudstone, carbonaceous shale, muddy sandstone and thin coal that was 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 (Roehler,

1977). The Tipton Shale Member, or Tipton Tongue, 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 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 where it is only a few feet thick in T. 25 N., R. 102 W. 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 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).

Pilot Butte, an outlier of the Leucite Hills volcanic field approximately 20 miles (32 km) to the northeast, is capped by leucite-rich lava flows (Carey, 1955, and Bradley, 1964).

Recent deposits of alluvium cover the stream valleys of Fourteenmile Creek, Scotts Canyon and their tributaries.

Structure

The Pilot Butte 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

The Fort Union Formation coal beds were encountered in the British-American Oil Production #1 Gras well located near the northern boundary of the quadrangle at depths of approximately 4,100 and 4,600 feet (1,250 and 1,402 m) below the ground surface. These coal beds also occur in the Miami Oil Producers well in sec. 6, T. 19 N., R. 105 W., where they are present at depths of 5,100 and 5,600 feet (1,554 and 1,707 m). The upper coal bed is approximately 20 feet (6 m) thick in this quadrangle, thickening gradually to the west (Roehler, oral communication, 1978). Although correlation problems exist, the thick Fort Union coal beds found in this quadrangle thin eastward and are believed to crop out in both the Reliance quadrangle and the southwest quarter of the Boars Tusk 15-minute quadrangle.

Several thin Fort Union Formation coal beds were reported in three coal test holes drilled along the eastern edge of the quadrangle. None of the coal beds reported exceed 4 feet (1.2 m) in thickness.

Two coal beds of either the Wasatch or Fort Union Formations were also identified in the oil and gas wells drilled in this quadrangle. These coal beds are approximately 6 feet (1.8 m) thick and occur approximately 600 feet (183 m) stratigraphically above the thick Fort Union coal bed discussed above.


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

Dames & Moore has not made any determination of economic recoverability for any of the coal beds described in this report.

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 Pilot Butte quadrangle, coals of Reserve Base thickness (5 feet or 1.5 meters) or greater are believed to exist at depths that exceed 3,000 feet (914 m) at all points within the quadrangle. Because drill holes within the quadrangle are widely spaced, the possibility exists that other Wasatch or Fort Union Formation coal beds may be present at shallower depths. For this reason, Federal lands within the KRCRA boundary have been classified as having an unknown development potential for surface and subsurface mining methods.

Table 1 -- Sources of data used on plate 1

<u>Plate 1</u> <u>Index</u> <u>Number</u>	<u>Source</u>	<u>Data Base</u>
1	Rocky Mountain Energy Co., (no date), unpublished data	Drill hole No. 4-AS
2	Miami Oil Producers	Oil/gas well #2 White Mountain
3	Rocky Mountain Energy Co., (no date), unpublished data	Drill hole No. 1-AS
4		Drill hole No. 2-AS
5		Drill hole No. 6-AD
6		Drill hole No. 1-AS
7	British-American Oil Production Co.	Oil/gas well #1 Gras U.P.R.R.
8	Miami Oil Producers	Oil/gas well #1 Miami-State-1556

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