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COAL RESOURCE OCCURRENCE MAPS AND COAL DEVELOPMENT POTENTIAL OF THE MAXON RANCH QUADRANGLE, SWEETWATER COUNTY, WYOMING

[Report includes 3 plates]

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GEOLOGICAL SURVEY

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INTRODUCTION

Purpose

This text is to be used in conjunction with Coal Resource Occurrence (CRO) Maps of the Maxon Ranch 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 Published and unpublished public information available through June, 1978, was used as the data base for this study.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 Maxon Ranch quadrangle is located in southwestern Sweetwater County, approximately 23 airline miles (37 km) south of the city of Rock Springs. With the exception of Maxon Ranch, located in the southwestern corner of the quadrangle, and Ramsay Ranch, located on the west-central edge of the quadrangle, the area is unpopulated.

Accessibility

Wyoming Highway 373, a paved medium-duty road, passes through the Maxon Ranch quadrangle from north to south, connecting Interstate Highway 80 west of Rock Springs with the Wyoming-Utah border to the south of the quadrangle. An improved light-duty road, following Sage Creek in the quadrangles to the north and west, leaves Sage Creek in the northwestern corner of the Maxon Ranch quadrangle, turns southward along Trout Creek, crosses the Ramsay Desert, and then turns southeastward along Gooseberry Creek to join Wyoming Highway 373 at Sage Creek. It continues eastward along Sage Creek across the southern quarter of the quadrangle. A second light-duty road, following along a gas pipeline, crosses the southeastern corner of the quadrangle and joins the road to South Baxter northeast of

the quadrangle boundary. The remainder of the quadrangle is served by unimproved dirt roads and trails. Interstate Highway 80 lies approximately 22 airline miles (35 km) to the northwest of the quadrangle boundary.

The main east-west line of the Union Pacific Railroad passes through Rock Springs approximately 23 miles (37 km) north of the quadrangle. This line provides railway service across southern Wyoming, connecting Ogden, Utah to the west with Omaha, Nebraska to the east.

Physiography

The Maxon Ranch quadrangle lies on the southwestern edge of the Rock Springs uplift. The landscape is characterized by a generally rugged terrain of buttes, narrow valleys, and steep escarpments with long dip slopes. Altitudes in the quadrangle range from approximately 8,760 feet (2,670 m) on a butte in the southwestern corner of the quadrangle to approximately 6,800 feet (2,073 m) on Sage Creek in the northwestern corner of the quadrangle. Miller Mountain, with steep escarpments on the west and south and long dip slopes to the northwest, rises approximately 800 to 1,000 feet (244 to 305 m) above the Sage Creek valley in the northeastern half of the quadrangle.

Sage Creek and its tributaries, Camp Creek, Dry Hollow, and Trout Creek, drain the southwestern half of the quadrangle. They flow northwesterly across the quadrangle into Flaming Gorge Reservoir on the Green River northwest of the quadrangle boundary. Little Bitter Creek and Dans Creeks, a tributary of Salt Wells Creek, drain the northeastern half of the quadrangle. Both flow into Bitter Creek, a tributary of the Green River, north of the quadrangle boundary. All of the streams in the quadrangle are intermittent and 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, rabbitbrush, mountain mahogany, juniper, and grasses (U.S. Bureau of Land Management, 1978).

Land Status

The Maxon Ranch quadrangle lies in the southwestern part of the Rock Springs Known Recoverable Coal Resource Area (KRCRA). Approximately 25 percent of the quadrangle's total area lies within the KRCRA boundary. The Federal government owns the coal rights for approximately 80 percent of this area as shown on plate 2. No outstanding Federal coal leases, permits or licenses occur within the quadrangle.

GENERAL GEOLOGY

Previous Work

Schultz described and mapped the geology and coal resources of the southern part of the Rock Springs coal field in 1910. Gosar and Hopkins (1969) described the structure and stratigraphy of the southwestern part of the Rock Springs uplift. Tertiary-age stratigraphy in the area has been described by Roehler (1961), Bradley (1964), Culbertson (1965), and Roehler (1965). Cretaceous-age stratigraphy has been described by Hale (1950, 1955), Weimer (1960, 1961), Douglass and Blazzard (1961), Smith (1961, 1965), Keith (1965), and Roehler (1965, 1973, 1978).

Stratigraphy

The formations occurring in the Maxon Ranch quadrangle range in age from Upper Cretaceous to Oligocene. The Blair Formation, the Rock Springs Formation, the Ericson Sandstone, and the Almond Formation occur at depth within this quadrangle, and only the Almond and the Fort Union Formations are known to contain coal.

The Blair Formation of Upper Cretaceous age consists of a thick sequence of gray sandy marine shale and light-brown siltstone and sandstone (Hale, 1950, 1955, Smith, 1965, Keith, 1965, and Roehler, 1973).

The Rock Springs Formation of Upper Cretaceous age, conformably overlying the Blair Formation, is approximately 1,000 feet (305 m) thick where measured in the Sohio Petroleum well located in sec. 7, T. 14 N., R. 105 W.,in the Currant Creek Ranch quadrangle to the west (Douglass and Blazzard, 1961) The formation consists of the gray, very fine grained basal littoral sandstone of the Chimney Rock Tongue (Roehler, 1973), the dark-gray silty to sandy prodelta shales of the Black Butte Tongue, and the upper littoral sandstones of the Salt Wells Creek Member (Douglass and Blazzard, 1961). Smith (1961, 1965) divided the Salt Wells Creek Member into four separate tongues. These are the lower Brooks Tongue, a gray very fine grained sandstone interbedded with shale at the base of the tongue; the Coulson Tongue, a dark-gray silty shale; the McCourt Tongue, a light-gray very fine to fine-grained sandstone; and the upper Gottsche Tongue, a very dark-gray carbonaceous shale (Roehler, 1973). The Rock Springs Formation is not known to be coal-bearing in this quadrangle.

The Ericson Sandstone of Upper Cretaceous age conformably overlies the Rock Springs Formation. It consists of approximately 850 feet (259 m) of light-gray to gray, very fine to coarse-grained sandstones separated by a middle section of rusty-weathering sandstone, dark-gray shale and carbonaceous shale (Smith, 1961, and Roehler, 1973).

The Almond Formation of Upper Cretaceous age conformably overlies the Ericson Sandstone. It is approximately 860 feet (262 m) thick in the Ferguson Oil Company well located in sec. 32, T. 14 N., R. 104 W., but thins rapidly toward the north owing to an unconformity between the Almond Formation and the overlying Fort Union Formation. The Almond Formation consists of carbonaceous shale, siltstone, mudstone, sandstone and thin coal beds (Hale, 1950, 1955, and Roehler, 1973).

The Fort Union Formation of Paleocene age, unconformably overlying the Almond Formation, crops out within the quadrangle. It consists of intermontane swamp deposits of sandstone, siltstone, shale, carbonaceous shale, and coal. Roehler (1973) indicates that the Fort Union Formation is between 1,050 and 1,250 feet (320 and 381 m) thick in the adjacent Titsworth Gap quadrangle to the east.

The main body of the Wasatch Formation of Eocene age, which crops out in the Maxon Ranch quadrangle, is composed mainly of a fluviatile sequence of red sandstone, mudstone and shale that "interfinger with and are replaced in a northerly direction by drab-gray beds of the Ramsey Ranch Member of the Green River Formation" (Roehler, 1965). The thickness of 2,500 feet (762 m) shown on plate 3 probably includes a considerable section of the Ramsey Ranch Member.

The Luman Tongue of the Green River Formation of Late Eocene age conformably overlies the main body of the Wasatch Formation. It is composed mainly of low-grade oil shale and sandy limestone. Thicknesses range from approximately 45 to 200 feet (14 to 61 m) (Culbertson, 1965, and Roehler, 1965).

The Niland Tongue of the Wasatch Formation conformably overlies the Luman Tongue. It consists of sandstone, siltstone, mudstone, and brightly-colored variegated shale. Culbertson (1965) reports a thickness of approximately 300 feet (91 m) at the southern edge of the Maxon Ranch quadrangle. The Niland Tongue abrubtly changes lithologically to the north, where red-bed fluviatile facies predominate (Roehler, 1965).

The Tipton Shale Member of the Green River Formation crops out just above the Niland Tongue. It is a persistent unit of low grade, yellowish-brown oil shale approximately 170 feet (52 m) thick (Culbertson, 1965).

The Wilkins Peak Member of the Green River Formation is composed mainly of gray to green mudstone with abundant thin beds of siltstone, marlstone, dolomite, limestone, and sandstone (Roehler, 1965). Trona and halite deposits have been found in the lower part of the Wilkins Peak Member. The thickness of the Wilkins Peak Member, taken from a restored section of the Lower Eocene by Roehler (1965, fig. 1), totals approximately 1,300 feet (396 m).

The Bishop Conglomerate of Oligocene age (Roehler, 1977) crops out in the northeastern part of the quadrangle. It consists almost entirely of well-rounded cobbles and boulders of quartzite, quartz, hornblende gneiss, granite, and chert (Bradley, 1964, and Roehler, 1973) forming a resistant cap over the older strata.

Recent deposits of alluvium cover the stream valleys of Sage, Camp, and Gooseberry Creeks.

The formations of Cretaceous age in the Maxon Ranch quadrangle indicate the transgressions and regressions of a broad, shallow, north-south-trending seaway that extended across central North America. They accumulated near the western edge of the Cretaceous sea and reflect the location of the shoreline (Weimer, 1960 and 1961).

After the final withdrawal of the Cretaceous sea, the Fort Union Formation was deposited mainly in an intermontane paludal environment (Roehler, 1978).

Much of the Wasatch Formation was deposited in a well-drained, oxidizing stream environment. The Wasatch Formation red beds, where

formed, were probably deposited in poorly-drained areas. During the Late Eocene, fresh-water lakes formed and deposition of the oil shale of the Luman Tongue began. Swampy and fluvial conditions alternated with intervals of lacustrine environments during the formation of the Niland Tongue. The Tipton oil shales formed during the Late Eocene as a large inland lake developed which eventually covered many parts of the Green River, Washakie, and Great Divide Basins (Culbertson, 1965).

The Bishop Conglomerate was deposited during Oligocene time (Roehler, 1977) as vigorous streams eroded the higher parts of the Uinta Mountains to the south (Bradley, 1964).

Structure

The Maxon Ranch quadrangle is located on the southwestern flank of the Rock Springs uplift, a doubly plunging asymmetric anticline having a north-south axis. Wasatch Formation outcrops in the quadrangle generally strike northwest and dip between 3 and 5° to the southwest (Bradley, 1964). Cretaceous-age formations are believed to dip in the same direction at 5° to 10°.

COAL GEOLOGY

Coal beds of varying quality are known to occur in parts of the Rock Springs, Almond, Fort Union, Wasatch and Green River Formations on the western flank of the Rock Springs uplift. Analyses of electric logs available from oil and gas wells in the Maxon Ranch quadrangle indicate that only thin coal beds of less than Reserve Base thickness (5 feet or 1.5 meters) occur in the Fort Union and Almond Formations. However, Roehler (1973) indicates that coal beds up to 12.2 feet (3.7 m) thick occur within the Almond Formation in the adjacent Titsworth Gap quadrangle to the east. The literature discussing the coal beds in the Eocene, the Wasatch and Green River Formations in the Maxon Ranch area indicates that they are thin, lenticular and of poor quality.

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 either surface or subsurface mining methods. In the Maxon Ranch 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 on plate 1 is listed in table 1.

Table 1. -- Sources of data used on plate 1

Plate 1 Index Number	Source	Data Base
1	Caulkins Oil Co.	Oil/gas well No. 1 Gov't
2	Ferguson Oil Co. and Seaboard Oil Co.	Oil/gas well No. 1-32 U.S.-Miller Mountain
3	Jerry Chambers	Oil/gas well No. 1-12 Resources-Federal
4	Pan American Petroleum Co.	Oil/gas well No. 1 U.S.A.-Hobson-Kewanee-Gov't

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