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COAL RESOURCE OCCURRENCE MAP AND COAL DEVELOPMENT POTENTIAL OF THE IRON SPRING SW QUADRANGLE, BIG HORN COUNTY, MONTANA

[Report includes 3 plates]

By

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

CONTENTS

ILLUSTRATIONS

[Plates are in pocket]

Conversion table

To convert	Multiply by	To obtain
feet	0.3048	meters (m)
miles	1.609	kilometers (km)
acres	0.40469	hectares (ha)
tons (short)	0.907	metric tons (t)
short tons/acre-ft	7.36	metric tons/hectare-meter (t/ha-m)
Btu/lb	2.326	kilojoules/kilogram (kJ/kg)

INTRODUCTION

Purpose

This text is to be used in conjunction with the Coal Resource Occurrence (CRO) maps of the Iron Spring SW quadrangle, Big Horn County, Montana (3 plates; U.S. Geological Survey Open-File Report 78-632). This report was compiled to support the land planning work of the Bureau of Land Management in response to the Federal Coal Leasing Amendments Act of 1975, and to provide a systematic resource inventory of Federal coal lands in Known Recoverable Coal Resource Areas (KRCRAs) in the western United States.

Location

The Iron Spring SW 7 1/2-minute quadrangle is in northeastern Big Horn County, Montana, about 22 miles (35 km) southeast of the town of Bighorn and 18 miles (29 km) northeast of Hardin, Montana.

Accessibility

The Iron Spring SW quadrangle area is accessible from Hardin by going 2 miles (3.2 km) east on Interstate Highway 90, then east-northeast on local route 384 (Sarpy Road) 24 miles (38 km). Sarpy Road runs northeastward and eastward through the quadrangle and connects with a few unimproved roads.

A branch line of the Burlington Northern Railroad at the Absaloka (Sarpy Creek) Coal Mine, located 1.5 miles (2.4 km) east of the Iron Spring quadrangle in the Wolf School quadrangle extends northward 32 miles (51 km) to the main line of the railroad in the Yellowstone River Valley.

Physiography

The Iron Spring SW quadrangle is in the Missouri Plateau division of the Great Plains physiographic province. The intricately dissected land surface forms the divide between two northward-flowing perennial streams, Tullock Creek on the west and Sarpy Creek on the east. Tullock Creek joins the Big Horn River near its confluence with the Yellowstone River at the town of Bighorn about 20 miles (32 km) northwest of the quadrangle. Sarpy Creek joins the Yellowstone River about 28 miles (45 km) north of the quadrangle. Between the ephemeral tributaries of these streams stand the steep-sided, flat-topped Red Hills, capped by flat-lying, reddish clinker beds formed by the burning of coal strata in the Tongue River Member of the Fort Union Formation.

Elevations range from a low of 3,220 feet (981 m) on a tributary of Sarpy Creek at the northeastern corner of the quadrangle and along tributaries of Tullock Creek at the western edge of the quadrangle to a high of 3,879 feet (1,182 m) on the southern Red Hills in the south-central part of the quadrangle. Topographic relief is 659 feet (201 m).

Climate

Regional climate is semiarid and is characterized by pronounced variations in seasonal precipitation and temperature. Annual precipitation varies from less than 12 inches (30 cm) to about 16 inches (41 cm) a year. The heaviest precipitation occurs from April to August. The largest average monthly precipitation is during June. The highest temperatures, as much as 110 °F (43 °C), occur in July and the lowest, as low as -50 °F

(-46 °C), in January and February; the annual mean temperature is about 45 °F (7 °C) (Matson and Blumer, 1973, p. 6).

Land status

The quadrangle is located in the extreme northwestern part of the Northern Powder River Basin KRCRA. The Federal Government does not own any coal rights in this quadrangle because all Federal land and minerals were ceded to the Crow Indians in 1958.

GENERAL GEOLOGY

Previous work

Rogers and Lee (1923) mapped all except the southern two tiers of sections in the Iron Spring SW quadrangle as part of the Tullock Creek coal field, Rosebud and Big Horn Counties, Montana. Thom, Jr. and others (1935) mapped all of the quadrangle as part of the Geology of Big Horn County and the Crow Indian Reservation. Most of the area of the quadrangle mapped was by Tudor (1975) as part of the Geologic Exploration and Development of Coal in the Sarpy Creek Area, Big Horn County, Montana.

Stratigraphy

A generalized columnar section of the coal-bearing rocks is shown on the Coal Data Sheet (pl. 3) of the CRO maps. The exposed bedrock units belong to the Hell Creek Formation (upper Cretaceous) and the Fort Union Formation (Paleocene). The Hell Creek Formation crops out in a small area of the headwaters of East Cabin Creek, on the west border of the southwest quarter of the quadrangle. It is not coal bearing, and the upper 300 feet

(91 m) are predominantly shale (Rogers and Lee, 1923, p. 21,61). The Fort Union Formation is composed of three members: the upper Tongue River Member, the middle Lebo Shale Member, and the lower Tullock Member. Rogers and Lee (1923, p. 29) considered the Tullock to be a member of the Lance Formation, but since 1949 the U.S. Geological Survey has considered the Tullock in Montana to be the lowermost member of the Fort Union Formation.

The Tullock Member crops out in a small area of the southwestern part of the quadrangle. It is composed of yellowish sandstone and shale (Rogers and Lee, 1923, p. 29) and contains a thin, unimportant coal bed.

The Lebo Shale Member crops out throughout a considerable area in the southern and western parts of the quadrangle. It consists of dark-gray, olive-gray, and drab shale interbedded with a few beds of gray or yellow sandstone (Rogers and Lee, 1923, p. 35), and contains no coal beds of consequence.

The Tongue River Member crops out throughout the northern and eastern parts of the quadrangle and consists of light-colored sandstone and sandy shale. It contains a number of important coal beds. The member is at least 1,275 feet (389 m) thick where more completely exposed in the Little Wolf Mountains east of the Iron Spring SW quadrangle (Rogers and Lee, 1923, p. 41), but much of the member in the quadrangle has been removed by erosion so that a maximum of about 350 feet (107 m) remains.

Structure

The coal-bearing Fort Union strata dip eastward or southeastward 30 to 35 feet per mile (5.7 to 6.7 m) according to Tudor (1975, p. 164). No prominent folds or faults have been mapped.

COAL GEOLOGY

Four coal beds, all in the Tongue River Member, are mapped on the surface in this quadrangle (pl. 1) or are shown in section on plate 3. Two of these are sufficiently thick to contain reserves.

The stratigraphically lowest of the four beds is the Robinson coal bed, which lies about 100 feet (30.5 m) above the base of the Tongue River Member. Above the Robinson is a noncoal interval of 30 feet (9 m), the Stocker Creek coal bed, a noncoal interval of 60 feet (18 m), a local coal bed, a noncoal interval of 40 feet (12 m), and the Rosebud coal bed.

The coal beds crop out around the higher elevations in the northeast quarter and surrounding areas of the quadrangle (pl. 1). The Robinson coal bed ranges from 10 feet (3 m) to 19 feet (5.8 m) in thickness, and the Rosebud coal bed ranges from 7 feet (2.1 m) to 28 feet (8.5 m) in thickness (pl. 3). The Stocker Creek and local coal beds are lenticular and less than 3 feet (0.9 m) thick. Large areas of the thicker coal beds have burned, forming clinker beds.

The entire quadrangle lies within the Crow Indian ceded area and the Crow Indian Reservation. There are no Federal coal lands. Most of the lands belong to the Crow Indian Tribe or to individuals. For this reason no CRO maps were made for individual coal beds, and no coal resource tonnages

were estimated. No CDP (Coal Development Potential) maps for surface or for underground mining were made.

REFERENCES

Matson, R. E., and Blumer, J. W., 1973, Quality and reserves of strippable coal, selected deposits, southeastern Montana: Montana Bureau of Mines and Geology Bulletin 91, 135 p.

Rogers, G. S., and Lee, Wallace, 1923, Geology of the Tullock Creek coal field, Rosebud and Big Horn Counties, Montana: U.S. Geological Survey Bulletin 749, 181 p.

Thom, W. T., Jr., Hall, G. M., Wegemann, C. H., and Moulton, G. F., 1935, Geology of Big Horn County and the Crow Indian Reservation, Montana, with specific reference to the water, coal, oil, and gas resources: U.S. Geological Survey Bulletin 856, 200 p.

Tudor, M. S., 1975, Geological exploration and development of coal in the Sarpy Creek area, Big Horn County, Montana: Montana Geological Society 22nd Annual Publication, Energy Resources of Montana, p. 159-164.